CONSTRUCTION SPECIFICATION FOR
PIPELINE AND CONDUIT INSTALLATION BY PIPE BURSTING

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463.01 SCOPE

This specification covers requirements for installation of pipelines and conduits using the trenchless technology known as pipe bursting.

463.01.01 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.
463.01.02 Appendices Significance and Use

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.

463.02 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 407 Maintenance Hole, Catch Basin, Ditch Inlet, and Valve Chamber Installation
OPSS 409 Closed-Circuit Television Inspection of Pipelines
OPSS 493 Temporary Potable Water Supply Services
OPSS 503 Site Preparation for Pipelines, Utilities, and Associated Structures
OPSS 504 Preservation, Protection, and Reconstruction of Existing Facilities
OPSS 507 Site Restoration Following Installation of Pipelines, Utilities and Associated Structures
OPSS 514 Trenching, Backfilling, and Compacting
OPSS 517 Dewatering of Pipeline, Utility, and Associated Structure Excavation
OPSS 538 Support Systems
OPSS 539 Temporary Protection Systems
**463.03 DEFINITIONS**

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

**Fusion** means connecting product lengths into a continuous length using elevated temperatures and pressure.

**Launch Pit** means an access excavation or existing access structure to an existing product for the insertion of the pipe bursting head and new product.

**Pipe Bursting** means the application of a pipe bursting head into the interior of and along the length of an existing product to split or fracture the existing product so that the existing product and surrounding material is opened up to a sufficient size to accommodate the insertion of a new product in the cavity created, without leaving any significant voids around the new product. Pipe bursting methods include static, pneumatic, and hydraulic. Pipe bursting is also known internationally as pipe cracking or pipe splitting.

**Product** means pipelines or conduits.

**Pull** means the installation of one continuous reach of new product. Generally, a pull shall commence at a launch pit and terminate at a pull pit.

**Pull Pit** means an access excavation or existing access structure to an existing product to receive the new product or pipe bursting head or both.

**Structure** means a maintenance hole, valve chamber, or other such facility to access the product.

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**463.04 DESIGN AND SUBMISSION REQUIREMENTS**

**463.04.01 Submission Requirements**

The following information shall be submitted to the Contract Administrator 7 Days prior to the commencement of pipe bursting operations:

a) A work plan outlining the schedule, procedures, launch pit and pull pit locations, and Working Drawings required to execute the work on the product, service laterals, and structures.

b) A list of personnel, including backup personnel, and their qualifications and experience.

c) A traffic control plan.

d) Safety plan, including the contracting company safety manual and emergency procedures.

e) When fusion joining is used, written record of current training showing that the operator has been fully trained in the use of the fusion equipment by an authorized representative of the fusion equipment manufacturer and the product manufacturer or, when applicable, certified by the Owner or Utility for which the work is being completed.

f) When applicable, product bypass and temporary supply system plans, including installation, operation, and testing procedures and a list of material and equipment to be used.

g) Manufacturer's technical data containing complete information on new product:
   i. Material composition, physical properties, inside diameter, and wall thickness.
   ii. Maximum tensile strength and corresponding maximum allowable pulling force.
   iii. Transporting, handling, and storing recommendations.
   iv. Repair.
v. Fusion times and temperatures.
vi. Minimum bend radius.
vi. Recommended restraint method in structure.
viii. Product recovery requirements.
ix. Relaxation requirements.

h) Contingency plans for the following potential conditions:

i. Unforeseen obstructions causing burst stoppage.
ii. Deviation from required alignment and grade.
iii. Extended service disruption.
iv. Damage to the existing service connections and the replacement of product's structural integrity and methods of repair.
v. Damage to other existing Utilities.
vi. Soil heaving or settlement.
vii. Contaminated soil or water.
viii. Alignment passing through buried structures.

463.05 MATERIALS

463.05.01 Pipe Materials
Pipe type, class, pressure rating, and size shall be as specified in the Contract Documents.

463.05.02 Valves
Valve type, class, pressure rating, and size shall be as specified in the Contract Documents.

463.05.03 Fittings
Fittings shall be suitable for and compatible with the type, class, pressure rating, and size of pipe with which they are used.

463.05.04 Lubricant
Lubricant used to reduce friction, to maintain the annular space created by the pipe bursting head, and to allow the insertion of the new product shall be non-toxic and biodegradable.

463.06 EQUIPMENT

463.06.01 Pipe Bursting Head
The pipe bursting head shall be according to the manufacturer’s specifications for head sizes recommended for various product diameters and types, as well as parameters associated with maximum allowable upsize percentages.

463.06.02 Pipe Bursting Power Source
The pipe bursting power source shall generate sufficient force to burst and compact the existing product into the surrounding material.
463.06.03 Fusion Equipment

Fusion equipment, when used, shall be sized and rated for the product. Fusion clamps shall be sized to clamp the new product properly.

463.07 CONSTRUCTION

463.07.01 General

The product shall be installed following the alignment and grade of the existing pipe and to the ovality specified in the Contract Documents.

The Contract Administrator shall be notified at least 48 hours prior to commencement of work.

463.07.02 Site Preparation

Site preparation shall be according to OPSS 503 and as specified herein.

The work site shall be graded or filled to provide a level working area for the pipe bursting equipment. No alterations beyond what is required for the pipe bursting operations shall be made. All activities shall be confined to designated work areas.

463.07.03 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 504.

When specified in the Contract Documents, an existing facility shall be exposed to verify its horizontal and vertical location. The number of exposures required to monitor work progress shall be as specified in the Contract Documents.

463.07.04 Transporting, Unloading, Storing, and Handling Materials

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

463.07.05 Trenching, Backfilling, and Compacting

Trenching, backfilling, and compacting for launch pits, pull pits, and other excavation locations shall be according to OPSS 514.

Launch pits and pull pits shall be sized to allow the use of the pipe bursting equipment and to allow the product to be installed such that the product manufacturer's recommendations for product bending radius are not exceeded.

463.07.06 Support Systems

Support systems shall be according to OPSS 538.

463.07.07 Dewatering

Dewatering shall be according to OPSS 517.
463.07.08 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.

463.07.09 Temporary Potable Water Supply Services

When specified in the Contract Documents, temporary potable water supply services shall be according to OPSS 493.

463.07.10 Product By-Pass

When specified in the Contract Documents, during the execution of the work the flow within the existing product shall be bypassed around the product being replaced and the continuity of service to each facility connected to the affected section of product shall be maintained.

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

463.07.11 Preparation of Existing Product and Structures

All existing crosses, tees, valves, and service connections shall be located, exposed, and disconnected prior to any pipe bursting operation.

Prior to pipe bursting, the inlets, outlets, and benching of existing structures shall be enlarged sufficiently for clearance of the pipe bursting head and the new product. Enlargements shall be made neatly and be no greater than that required for their purpose. Size of the enlargements shall be sufficient to allow for restoration and sealing to the new product.

Existing product shall be cleared of obstructions (e.g., rocks and debris) or mechanical obstructions (e.g., repair sleeves, clamps, couplings, and intolerable deviations in grade or alignment) prior to pipe bursting.

463.07.12 Product Joining

463.07.12.01 General

The product shall be joined according to the manufacturer’s recommendations.

The product shall be assembled and joined at the site to provide a leak-proof joint.

When space and the Contract Documents permit, the length of the product to be pulled shall be joined as one length prior to the commencement of the pulling operation.

When used, fusion shall be performed by technicians trained in the use of the fusion equipment.

Joints shall be capable of withstanding the loading of the installation process. All joints shall be subject to acceptance by the Contract Administrator prior to insertion.

463.07.12.02 Connection to Product or Structures

Product shall be allowed to recover from any induced stresses and strains before connection to new or existing product or structures are made. Product recovery time shall be according to the manufacturer’s recommendations.
The product connection to the structure or to an existing product shall be leak-proof.

463.07.12.03 Service Connections

Service connection work shall be as specified in the Contract Documents.

Service connection work shall not commence until the product has fully recovered.

463.07.13 Product Installation

Installation procedures shall be according to the product manufacturer’s guidelines.

The product shall be protected from damage during the installation process.

Suitable guides shall be used to protect the product from damage at the insertion point and at any intermediate re-entry points.

Upon commencement of the bursting process, product insertion shall be continuous from the launch pit to the pull pit, except when approved by the Contract Administrator. A pushing machine may be used to assist insertion from the rear.

When specified in the Contract Documents, a weak link, breakaway connector, or load monitor shall be used to prevent excess pulling force from damaging the product.

463.07.14 Structures and Valves

When the new product enters or exits an existing structure, the structure wall shall be restored as specified in the Contract Documents. Restoration shall securely locate and anchor the new product in the wall and shall produce a leak-proof seal.

The existing structure’s benching shall be restored according to the requirements of the new product, any other incoming product, and as specified in the Contract Documents.

When new structures or valves are specified, they shall be installed according to OPSS 407 and OPSS 701, respectively.

463.07.15 Testing

Testing of the product joining and installation shall be as specified in the Contract Documents.

When specified in the Contract Documents, closed-circuit television (CCTV) inspection shall be completed on the new product after installation.

463.07.16 Record Keeping

Verification record requirements of the alignment and grade of the installed product shall be as specified in the Contract Documents. A copy of the verification records shall be given to the Contract Administrator at the completion of the pipe bursting operations.

463.07.17 Closed-Circuit Television Inspection

CCTV inspection shall be according to OPSS 409.

463.07.18 Site Restoration

Site restoration shall be according to OPSS 507.
463.07.19 Management of Excess Material
Management of excess material shall be according to the Contract Documents.

463.08 QUALITY ASSURANCE
463.08.01 Acceptance Criteria
Acceptance criteria for the product installation shall be as specified in the Contract Documents.

463.09 MEASUREMENT FOR PAYMENT
463.09.01 Actual Measurement
463.09.01.01 Product Installation by Pipe Bursting
Measurement for a product installation by pipe bursting 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 by length in metres to the centre of the structure.

463.09.01.02 Service Connections
For measurement purposes, a count shall be made of the number of existing services that are disconnected from the existing product and reconnected to the new product.

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

463.10 BASIS OF PAYMENT
463.10.01 Product Installation by Pipe Bursting, “type of product, diameter of product, use of product” - Item
Product Bypass - Item
Service Connections - Item
Closed-Circuit Television Inspection - 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.

463.10.02 Closed-Circuit Television Inspection
When the Contract does not contain a separate tender item for CCTV inspection, the Contract price for the Product Installation by Pipe Bursting item shall include full compensation for all labour, Equipment, and Material to do the work of CCTV inspection.
Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

This specification was written to encompass the majority of pipe bursting operations for small and medium sized projects. However, the basic design considerations should always include properly planned entry and exit points, grade of existing host pipe, adjacent Utilities, and connection requirements.

The International Pipe Bursting Association (IPBA) normally assigns pipe bursting work to one of three classifications. These following classifications are intended for use as general guidelines when considering replacement of existing pipe by pipe bursting techniques.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Depth of Pipe m</th>
<th>Existing Pipe Diameter mm</th>
<th>New Pipe Diameter Options</th>
<th>Burst Length m</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Routine</td>
<td>&lt; 3.65</td>
<td>100 - 300</td>
<td>Size for size to 1 up size</td>
<td>0 - 100</td>
</tr>
<tr>
<td>B - Challenging to moderately difficult</td>
<td>&gt; 3.65 &lt; 5.5</td>
<td>300 - 500</td>
<td>2 up sizes</td>
<td>100 - 140</td>
</tr>
<tr>
<td>C - Difficult to extremely difficult</td>
<td>&gt; 5.5</td>
<td>500 - 900</td>
<td>3 or more up sizes</td>
<td>&gt; 140</td>
</tr>
</tbody>
</table>

The designer may consider a pre-qualification process, if the project is in Classification B or C.

The designer should include the following in the Contract Documents:

- Pipe type, class, pressure rating, and size. (463.05.01)
- Valve type, class, pressure rating, and size. (463.05.02)
- Product ovality. (463.07.01)
- Service connection work. (463.07.12.03)
- Benching restoration. (463.07.14)
- Testing of product joining and installation. (463.07.15)
- Verification record requirements. (463.07.16)
- Acceptance criteria. (463.08.01)
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The designer should determine if the following are required and, if so, they should be specified in the Contract Documents:

- Exposing existing facilities. (463.07.03)
- Use of temporary potable water supply services. (463.07.09)
- Product by-pass. (463.07.10)
- Joining and pulling product as one length. (463.07.12.01)
- Use of a weak link, breakaway connector, or load monitor. (463.07.13)
- Wall restoration. (463.07.14)
- Completion of a CCTV inspection. (463.07.15)

The designer should give consideration, in consultation with the pipe manufacturer, to minimum allowable product bending radii commensurate with the pipeline’s strength.

The designer should give special consideration to the required grades at the entry and exit points. The designer may undertake a CCTV inspection and location analysis prior to pipe bursting to review the existing line and grade to determine if deviations are acceptable.

Product upsizing by using a pipe bursting technique may induce stresses in the surrounding soil resulting in potential damage to nearby Utilities and foundations. The degree of distortion on the zone of influence is a function of the degree of upsizing, the pipe material of a nearby Utility, the location of nearby Utilities in relation to the pipe burst pipe, and the soil conditions. The designer may consider exposure of critical services by non-destructive methods to monitor the pipe bursting progress and impacts.

The designer should consider the need for product bypass, temporary potable water supply services, or temporary flow stoppage or blockage with inflatable plugs during the pipe bursting operation. The designer may require that during the execution of the work, the flow shall be bypassed around the product being replaced and the continuity of service to each facility connected to the affected section of product be maintained. The designer should consider what should be done if there is an extended service disruption.

For certain product installations, the designer may consider the requirement of a weak link, breakaway connector, or load monitor to prevent excess pulling force from damaging the product.

The designer should consider the type of interface and the degree of continuity between the new product and the existing structure to ensure appropriate anchoring and seals in order to prevent new product retraction or inadvertent leaks to the new system.

The designer may specify the completion of a CCTV inspection of the product after installation, particularly when grade thresholds are critical. In smaller diameter product installations when the designer elects to complete a CCTV survey, the designer may wish to specify a lighter interior colour of the product installation, if available.

Testing of product joining and installation may include hydrostatic, air, BACT-T, etc.

Verification record requirements may include such information as reporting information available from the pipe bursting machine, daylighting, installation of tracer wire with the product, the use of acoustic or magnetic locating equipment, etc.
Appendix 463-A

Acceptance criteria requirements may include such considerations as successful bursting operation from entry to pull back location; CCTV inspection, removal of extra coupon pipe length from the pull back pit to view for stresses, grade verification, etc.

The designer may consider including a process regarding payment for failed pipe bursting attempts in the Contract Documents.

The tender item description for Product Installation by Pipe Bursting should include reference to one or more of the attributes shown (i.e., type of product, diameter of product, and use of product) to be complete.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.