Amendment to OPSS 415 (Nov 2013) – Construction Specification for Pipeline and Utility Installation by Tunnelling

OPSS 415.06 EQUIPMENT

Section 415.06 of OPSS 415 is amended by the addition of the following paragraph:

Any equipment used in the work shall be operated in a manner satisfactory to the Contract Administrator and according to Toronto Municipal Code, Chapter 591 Noise. Modifications to the equipment as deemed necessary by the Contract Administrator shall be at no extra cost the Owner.

OPSS 415.09 MEASUREMENT FOR PAYMENT

OPSS 415.09.01.01 Tunnel

Clause 415.09.01.01 of OPSS 415 is deleted in its entirety and replaced with the following:

Measurement will be in metres along the centre line of the tunnel from inside face to inside face of maintenance holes or chambers or from the end of the tunnel where no maintenance hole or chamber is installed. The measurement will not include the distance through any structure including maintenance holes and chambers.

CONSTRUCTION SPECIFICATION FOR PIPELINE INSTALLATION BY TUNNELLING

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415.01 SCOPE

This specification covers the general requirements for pipeline installation by tunnelling.

415.01.01 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.

415.01.02 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.

415.02 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 517 Dewatering of Pipeline, Utility, and Associated Structure Excavation

Ontario Provincial Standard Specifications, Material

OPSS 1350 Concrete - Materials and Production
OPSS 1440 Steel Reinforcement for Concrete

415.03 DEFINITIONS

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

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

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

Pipeline means to include sewers, culverts, watermains, and forcemains.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

Rock means natural beds or massive fragments, or the hard, stable, cemented part of the earth's crust, igneous, metamorphic, or of sedimentary origin, which may or may not be weathered and includes boulders having a volume of 0.5 m^3 or greater.

415.04 DESIGN AND SUBMISSION REQUIREMENTS

415.04.01 Design Requirements

The primary liner shall be designed to support all soil and hydrostatic pressures and to withstand any additional loads caused by grouting or jacking thrusts. The primary liner design and access shaft details shall bear the seal and signature of an Engineer.

415.04.02 Submission Requirements

When any of the following information is not specified in the Contract Documents, it shall be submitted to the Contract Administrator for review a minimum of 14 Days prior to commencing tunnelling operations:

a) Design criteria.

b) Materials.

c) Construction shaft and portal details.

d) Tunnelling method.

e) Face support and other temporary support details.

f) Primary liner and support design details.

g) Material mixture for filling voids and procedures.

h) Tunnel boring machine information, if applicable.

i) Type and strength of rock bolts, if applicable.

j) Lighting and ventilation details.

k) Settlement monitoring plan.

l) Excavation and dewatering plan.

m) Testing and monitoring plan.

415.05 MATERIALS

415.05.01 Concrete

Concrete shall be according to OPSS 1350 and with a nominal minimum 28-Day compressive strength of 30 MPa.

415.05.02 Steel Reinforcement

Steel reinforcement for concrete work shall be according to OPSS 1440.

415.05.03 Primary Liner

The primary liner shall be as specified in the Contract Documents or according to the Contractor's submission.

415.05.04 Rock Bolts

Rock bolts and nuts shall have a minimum tensile strength of 400 MPa.

415.06 EQUIPMENT

The Contractor shall select and use Equipment and associated methods compatible with the selected dimensions of the tunnel and with the subsurface and groundwater conditions at the site.

415.07 CONSTRUCTION

415.07.01 General

The location of tunnels shall be established from the plan, lines, elevations, and tolerances as specified in the Contract Documents.

All reference points necessary to construct the tunnel and appurtenances shall be laid out prior to commencement of the tunnelling operation.

The Contract Administrator shall be provided with the assistance and access necessary to check the layout of the tunnel and associated appurtenances.

415.07.02 Construction Shafts

Construction shafts shall be provided at locations as specified in the Contract Documents or according to the Contractor's submission.

Shafts shall be maintained in a drained condition.

A secure fence shall be installed around the perimeter of the construction shaft area with gates and truck entrances. The fence shall be removed upon completion of the work.

415.07.03 Stability of Excavation

The construction methods, plant, and procedures employed shall ensure that the excavations are stable, free from disturbance, and maintained in a drained condition.

The construction methods, plant, and materials employed shall prevent the migration of soil material into tunnels or shafts.

415.07.04 Tunnelling

An individual with previous experience in the construction of tunnels shall supervise the work at all times.

The tunnelling method shall be suitable to deal with changing ground conditions that may be encountered during the progress of the work.

Methods of excavating the tunnel shall be capable of fully supporting the face and shall accommodate the removal of boulders and other oversize objects from the face.

The tunnel shall be kept sufficiently dry at all times to permit work to be performed in a safe and satisfactory manner.

415.07.05 Dewatering

Dewatering shall be according to OPSS 517.

415.07.06 Primary Liner

The primary liner shall be installed so that the exterior is as tight as possible to the excavated surface of the tunnel and allows the placement of the full design thickness of the secondary lining.

All voids between the primary lining and the surface of the excavation shall be filled. If an unexpanded liner is used, the space outside the liner plates shall be grouted at least daily.

Tunnels excavated in sound rock shall be supported in a manner that prevents scaling and unravelling of the rock and also protects the rock from weathering or deterioration.

Tunnels excavated in unstable rock shall be supported by means of rock bolts or an anchoring system in a manner that safely sustain the tunnel crown and walls.

415.07.06.01 Primary Liner Support Systems

Primary liner support systems shall minimize ground movement into the excavation, ensure stability, and maintain strength of the ground surrounding the excavation.

Primary liner support systems shall be compatible with encountered ground conditions, method of excavation, method of groundwater control, and with the placement of permanent liners.

Primary liner support systems shall prevent weathering, deterioration, loosening, or unravelling of ground surfaces exposed by excavation.

415.07.06.02 Single Liner Systems

Single liner systems shall be as specified in the Contract Documents.

415.07.07 Secondary Liner

The secondary liner shall be as specified in the Contract Documents.

The void outside the finished secondary liner shall be filled as specified in the Contract Documents or according to the Contractor's submission.

415.07.08 Testing and Monitoring

Testing and monitoring shall be as specified in the Contract Documents or according to the Contractor's submission.

415.07.09 Certificate of Conformance

A completed Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the work. The Quality Verification Engineer shall affix his or her seal and signature to the completed Certificate of Conformance confirming that the following are in general conformance with the requirements of the Contract Documents:

a) Work

b) Material and installations

c) Inspection, testing, and test results

415.07.10 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

415.09 MEASUREMENT FOR PAYMENT

415.09.01 Actual Measurement

415.09.01.01 Tunnel

Measurement of tunnel shall be by length in metres along the centreline of the tunnel from centre to centre of maintenance holes or chambers or to the ends of the tunnel, where no maintenance hole or chamber is installed.

415.09.01.02 Rock Excavation in Tunnelling

Measurement of rock excavation in tunnelling shall be by volume in cubic metres based on the neat lines of the tunnel as shown in the Contract Documents.

415.09.02 Plan Quantity Measurement

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

415.10 BASIS OF PAYMENT

415.10.01 Tunnel - Item
Rock Excavation in Tunnelling - 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.

Appendix 415-A, November 2013
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

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 requirements for the construction of pipelines, drainage conduits, or other utility pipe installations by the tunnelling method. It is not intended to be a specification for other tunnelling applications such as the transportation industry, mining, hydro electric, petroleum exploration industry, etc.

Engineering design based on geotechnical pre-design information is essential prior to the use of this specification for tunnelling projects.

The experience of the tunnelling Contractor is of prime importance. The designer may recommend prequalification of bidders.

The designer should specify the following in the Contract Documents:

- Primary liner requirements. Alternatively, the designer may elect that the Contractor is responsible for determining the primary liner design details. (415.05.03)

- The plan, lines, elevations, and tolerances required for the tunnelling project. (415.07.01)

- Location of required construction shafts. Alternatively, the designer may elect to specify that the Contractor is responsible for determining shaft locations to suit the method of construction. (415.07.02)

- The appropriate single liner systems type, class, dimensions, etc. (415.07.06.02)

- The appropriate secondary liner type, class, dimensions, etc. (415.07.07)

- The method of verifying the product installation. This may include reporting information from the tunnelling machine, daylighting, trace wire, survey, acoustic or magnetic location, GPS, closed-circuit television (CCTV) inspection, or mandrel tests. The designer should also specify the applicable leakage, infiltration, exfiltration, or pressure test requirements for the installation. This may apply to either the primary and secondary liner or just the secondary liner. (415.07.08)

The designer should provide benchmark and reference points for laying out the project.

The designer should specify if the shafts are to remain in place or be removed upon completion of the project. If the shafts are to remain in place, further details should be provided as to how they should be covered or remain accessible for future use.

The designer may wish to consider including a process regarding payment for failed tunnelling attempts in the Contract Documents.

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.