



THE CORPORATION OF THE CITY OF NIAGARA FALLS

REQUEST FOR PRE-QUALIFICATION

RFPQ8-2020

Pre-Qualification of Microtunnelling Sub-Contractors Oakwood Watermain QEW Crossing

SCOPE OF WORK

1.0 Project Description

This description of the scope of work is intended to provide a qualitative overview of the tunnelling portion of this project. Quantitative references are approximate only and are provided as a guide to the magnitude of work, and the expected capability of firms intending to pre-qualify for the microtunnelling portion of the Bid. It is expected that construction will start in early spring 2020. Construction is generally confined within road right-of-ways and green space.

Details of the proposed crossing are shown on Drawing No. QEW-WM-PP1, dated May 30, 2016 which has been provided in Appendix D. The aforementioned drawing shows that an approximately 200m long 200mm diameter watermain will be installed between existing watermains near Marpin Court and Oakwood Drive, in Niagara Falls, Ontario. Approximately 95m of the proposed watermain alignment will be housed within a primary steel liner for crossing the QEW and will be installed by microtunnelling. Receiving and exit shafts will be required to complete the works. The remaining portion of watermain alignment, about 100m in length beyond the QEW right of way between the shaft and Oakwood Drive, will be installed by open cut methods.

Work on the Oakwood Watermain is to generally include:

- | | |
|---------------|--|
| Length: | Approximately 103m of 200mm installed by open trench and approximately 96m of watermain of 200mm sliplined inside a steel liner that will be microtunnelled. |
| Right-of-way: | The alignment is currently within road allowances and green space under the control of the City of Niagara Falls. There are areas requiring safety measures including barriers, fencing, security patrols, cleanup, reclamation, and restoration of landscaping, road structure, and fences. |
| Material: | Pipe materials may include steel liner with all joints welded housing the 200mm PVC carrier pipe. |
| Crossings: | The entire trenchless installation will be completed within the MTO's ROW. Crossings of note include the Queen Elizabeth Way Highway. Other municipal and franchise utility crossings may exist. |

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1.1 Anticipated Ground Behaviour

A geotechnical investigation was completed for this project, in September 2016. A copy of this document entitled, Foundation Investigation and Design Report for QEW Watermain Crossing, City of Niagara Falls, ON completed by WSP Canada Inc. can be found in Appendix E. The Owner does not take responsibility for the accuracy of the information and provides it for consideration by tenderers.

1.2 Microtunnelling Trenchless Method

The method for the installation of the watermain below the QEW is microtunnelling technique. The tunnel liner may be either 600mm or 900mm in diameter. Microtunnelling is a method whereby the liner is jacked into a bore mined remotely using a microtunnel boring machine head fixed to the lead pipe segment. Operation of the MTBM (microtunnel boring machine) is done from the launching shaft. Soils removal, using the slurry shield MTBM method is performed by mixing the excavated soil in the front chamber of the MTBM head to the consistency of a slurry with conditioning using bentonite, water and other soil conditioning agents and then pumping this slurry back to the launch shaft and then up to grade where it is de-sanded and thickened. The rate of slurry removal from the chamber is carefully controlled and matched to the advance rate of pipe jacking such that the predicted lateral earth pressures are balanced with the slurry pressure. The MTBM head must be designed to resist the earth pressure including water pressure and to accommodate cobbles and boulders. The MTBM must also be fitted with appropriate high-pressure water jets to deal with the cohesive silty clay and appropriate separation plant to remove clay and silt sized particles and lumps from the slurry.

From the Standard Design and Construction Guidelines for Microtunnelling, Section 12.2 MTBM

The Microtunnelling boring machine (MTBM) should meet the following minimum capabilities and performance requirements:

- It must be capable of providing positive face support (both earth and water pressure).
- It must be articulated in such a way as to enable controlled steering in both the vertical and the horizontal direction, to a tolerance of plus or minus 3 percent of the MTBM diameter on grade or 25 mm (1 in.), whichever is greater, and 6 percent of the MTBM diameter on line or 50 mm (2 in.), whichever is greater, and from the design grade and line.
- All MTBM functions must be controlled remotely, typically from a surface control unit.
- The MTBM's rotation must be capable of being controlled. The cutter wheel must be capable of bidirectional drive. Antiroll fins or grippers may also be installed, but not as the primary method of rotation control.

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- It must be possible to inject lubricant around the exterior of the jacked pipe at the back of the MTBM.
- With proper operation of the MTBM, it must be possible to control heave and settlement to acceptable tolerances, as indicated in the contract documents

1.3 Shaft Construction

Shafts shall be designed for and constructed through the geotechnical materials as indicated in the Foundation Investigation and Design Report. Shafts will be used to launch and receive the tunnelling equipment. Contractor shall be responsible for determining size of shafts and shoring design. As stated above, tunnelling with 600mm and 900mm liner is feasible. The base of the shafts will be approximately four to five metres below the ground surface. The design and construction of the temporary shaft support will be the responsibility of the contractor who must retain a specialist shoring design engineer. Shoring design must follow the requirements of the 4th Edition of the Canadian Foundation Engineering Design Manual.

Requirements for coordination of the above will be the responsibility of the successful Contractor as part of the future tendering of the project.

1.4 Settlement Monitoring

The Contractor shall be responsible for designing, installing and monitoring a ground settlement monitoring program to avoid damage to all adjacent structures, paved areas and utilities to suit the various surface conditions of the various tunnel drives. The Foundation Investigation and Design Report recommends that the ground displacement be monitored by installing road mounted prisms (RMP) across the highway. Consistent with MTO requirements RMPs should be installed along the pavement marking lines above the centerline of the tunnel. In addition to the RMPs, Shallow Settlement Points (SSP) and Deep Settlement Points (DSP) should be installed between the shafts and the nearest edge of the pavement in order to monitor the ground movements before the tunnel reaches the paved portions of the highway.

WSP Canada Inc. have designed a Recommended Layout of Ground Monitoring Arrays and the MTO Encroachment Permit for this assignment is based on WSP Canada Inc. layout and MTO Guidelines for Foundation Engineering – Tunnelling Specialty For Corridor Encroachment Permit Application. The Contractor will be responsible for submitting their own settlement monitoring plan, in accordance with WSP Canada Inc and MTO Guidelines for Foundation Engineering – Tunnelling Specialty For Corridor Encroachment Permit Application. recommended layout, to the Engineer and MTO for review and approval prior to the commencement of any tunnelling works.

Requirements for coordination of the above will be the responsibility of the successful Contractor as part of the future tendering of the project.

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2.0 RFPQ, Evaluation & Notification Timeline

RFPQ

- Open: Tuesday February 4th, 2020, 10:00am
- Close: Tuesday, February 18th, 2020, 2:00pm

Evaluation and Notifications

- RFPQ Evaluations – February 18th, 2020 to February 25th, 2020
- Notification of Pass/Failure – February 25th, 2020

Dispute Resolution Period

- February 25th, 2020 to February 28th, 2020, 1:00pm

Tender Availability

- Approximately March 2020