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Chapter 17

Trenchless Technologies (for New Construction)

Design Specifications & Requirements Manual

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City of London

Design Specifications and Requirements Manual

The design information contained in this manual is intended to provide guidance beyond legislative and standard design practices for use in the City of London (the City). There will be site specific situations where the design will depart from these practices as it is not possible nor is it the intention of the City to anticipate every situation. The City intends to review and revise the Manual from time to time. The City also acknowledges that other references such as the 'Standard Contract Documents for Municipal Construction Projects' are to be used in conjunction with this manual. The 2012 update of this manual incorporates design information from the City's former 'Subdivision & Development Guide Manual' to provide consistent and current design information for development projects.

The City of London maintains its right to accept or refuse any design submissions and requires an acceptable design for any given circumstance.

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17 Trenchless Technologies (for New Construction)

17.1 Application

Trenchless installation of gravity sewers, watermains and forcemains is becoming more prevalent as a design alternative as the capabilities of the trenchless technologies advance. Trenchless Technologies can be a requirement of the City or proposed by a Consulting Engineer, as a viable alternative, given the particular design challenges for the specific site. Trenchless applications allow for the installation of the infrastructure with minimal disturbance of the surface area. Typical examples of where Trenchless Technologies may be viable alternatives to conventional methods include the installation of servicing through Environmentally Significant Areas (ESA's), under major roadways or railway lines, in built up areas where space is limited and the social costs would be excessive or even residential streets with mature trees.

In the past, when a Trenchless Technology was proposed, the Design Engineer relied heavily on the expertise of the contractor for any given scenario. As new methods come on stream, and the technologies are advancing, the onus will be shifting from the Contractor to the Design Engineer to design specific elements of the trenchless installations. It is important that the Design Engineer be qualified to design and oversee (certify) the specific types of technology being proposed.

17.2 Geotechnical Baseline Report (GBR)

A Geotechnical Baseline Report (GBR) is required when a Trenchless installation is being considered. The GBR will provide detail information related to the anticipated groundwater and soils conditions, including defining and assigning the various risks and liabilities to the Owner and/or the Contractor associated with the possible changes in ground conditions that may be encountered on the proposed alignment. This information will help the designer and contractor determine the appropriate trenchless method(s) for the proposed design application. The Design Engineer should provide necessary design parameters for the trenchless installation.

17.3 Trenchless Design Requirements

17.3.1 Items to be Considered by the Design Engineer as Part of the Design Process

As a minimum, the Design Engineer is to give due regard for designing the following elements of an appropriate Trenchless Installation:

- i. Pipe design (casing and/or carrier pipe as applicable)
 - a. Material, along with specific characteristics of this material
 - b. Dimensional Ratio (pulling forces, live loads, dead loads – as applicable)
 - c. Diameter
 - d. Alignment
 - e. Radius of Curvature (if applicable)
 - f. Grade
- ii. Adequate room for staging areas, pipe assembly, entry and exit portals (as appropriate)
- iii. Blocking and grouting requirements (of carrier pipe within a casing pipe)
- iv. Slurry/spoil disposal
- v. Erosion/Sediment Control Measures
- vi. Bore Geometry
- vii. Annular Space Plug
- viii. GBR Recommendations
- ix. Define the need for Dewatering and/or Permit to Take Water (if applicable)
- x. Timing as it relates to other activities, i.e. order of operations
- xi. Prequalification of the contractor

17.3.2 Information to be Included on the Construction Servicing Drawings/Tender Documents

This information should be shown on the engineering drawings and/or form part of the Tender Documents:

- i. Pipe design (casing and/or carrier pipe)
 - a. Diameter
 - b. Alignment
 - c. Grade (plus or minus if applicable and acceptable)
- ii. Adequate room for staging areas, pipe assembly, design of entry and exit portals (as appropriate)
- iii. Erosion/Sediment Control Measures

- iv. GBR Recommendations
- v. Define the need for Dewatering and/or Permit to Take Water (if applicable)

17.3.3 Items to be Considered in the Contract Tender Documents

Consideration should be given to addressing and/or including the following items as part of the contract tender:

- i. a tender item for a 911 emergency shaft
- ii. a tender item for “Frac Out” mitigation measures
- iii. cutter head requirements
- iv. over cut dimensions
- v. Swab run (depending on diameter and site specifics)
- vi. Bentonite lubrication
- vii. Machine launch & retrieval (groundwater impacts)
- viii. Annular space grouting
- ix. Settlement/heave
- x. Mitigation/contingency plans
- xi. Damaged Pipe
- xii. Tracking requirements
- xiii. Spoil/slurry disposal
- xiv. Methods of restraint against pull-back (as applicable)
- xv. Complete GBR
- xvi. Quality control (i.e. – videos, joint testing, etc. as appropriate for the technology being installed)

17.3.4 Record Drawing

As part of the Record Drawing submission, at the conclusion of the project, the drawings are to be updated to show what was installed including:

- i. Identify method of installation
- ii. Pipe design (casing and/or carrier pipe as applicable)
 - a. Material
 - b. Dimensional Ratio

- c. Diameter
 - d. Alignment
 - e. Grade
- iii. Blocking and grouting measures (as applicable)
- iv. Location of staging areas, entry/exit portals – in case of settlement issues later