2020 - SECTION 88

TRENCHING AND BACKFILLING

88.1 GENERAL

All trenching and backfilling operations related to water and sewer installations shall conform with these and other related specifications.

88.2 MATERIALS

88.2.1 NATIVE

Shall consist of material excavated from the trench. It shall contain no frozen soil, roots, rocks, organics or other objectionable material in quantities that might cause pipe damage, excessive settlement or inadequate compaction. The moisture content shall be such as to allow proper placement and compaction.

88.2.2 SAND

Shall consist of soil not excavated from the trench which has an even gradation falling within the following limits:

Screen Size (microns)	Allowable Passing (percent)
5,000	100
2500	70 to 95
315	30 to 65
160	10 to 25
80	2 to 10

88.2.3 GRAVEL

Shall consist of soil not excavated from the trench which has an even gradation falling within the following limits and with a 25% fracture count and a plasticity index below 8%:

Screen Size (microns)	Allowable Passing (percent)
20,000	95 to 100
12,500	75 to 95
5,000	40 to 60
2,000	25 to 45
400	10 to 25
80	2 to 10

88.3 INSTALLATION

88.3.1 TRENCHING

a) Trenching shall refer to the excavation of material for the purpose of installing water mains, sewer mains, force mains, service connections and all related appurtenances and fittings. Trenching shall only occur in areas shown on the drawings or as approved by Aquatera.

b) The trench shall be excavated so as to provide a uniform and continuous support for the bedding and pipe and to allow the pipe to be laid to the grades and alignments established by the Engineer. Any over excavation below the required grade shall be backfilled and compacted to 98% of SPD with an approved granular material at the Contractor's expense.

c) All trenches shall be restrained with adequate shoring and bracing in order to fully protect life, property, and the work. In suitable soils the trench may also be sloped back, however in both cases all excavations shall be in compliance with Occupational Health and Safety Act General Regulations.

d) The maximum trench width within the pipe zone shall be the greater of:

Pipe Diameter +600mm
or
1000mm
or
as shown on the Detailed Engineering Drawings

e) The minimum trench width within the pipe zone shall be the pipe diameter + 600mm

f) The trenching operation shall not extend further then 100 metres in advance of the pipe laying operation.

g) The Contractor shall remove all water from the trench after completion of the trenching operation and continuously dewater the trench until backfilling is complete.

88.3.2 MECHANICAL AUGERING

When utility lines are to cross under existing or future pavement, otherwise known as travelled areas, the pipes may be machine augured or bored. This shall occur in all instances where stipulated in the Detailed Engineering Drawings or directed by Aquatera. The alignment, depth and grade of the holes will be staked by the Engineer. The hole shall be sufficient diameter to permit the carrier pipe and casing pipe, if specified, to be installed to required grades and alignments and shall adhere to the Augering Specifications.

88.3.3 BACKFILLING

Backfill within the pipe zone shall adhere to the following standards. Outside of the pipe zone backfill materials and compaction standards shall be those of the municipality in which the work is undertaken, or in the absence of such standards the following shall apply**:**

a) Backfilling shall consist of the supply, installation and compaction of material into the backfill zone of the trench. The backfill zone is that part of the trench between the surface of the undisturbed ground and an elevation 300 mm above the top of the pipe.

b) Material used as backfill shall be in accordance with the material specifications. The various classes of material shall be placed and compacted as follows:

i) Native backfill shall be placed in layers not greater than would allow the firm compaction of the material. The backfill should be placed so as to minimize future trench settlement.

ii) Compacted Native backfill shall be placed in layers no greater than 300mm and then compacted to 98% as measured with the Standard Proctor Density test.

iii) Compacted Sand backfill shall be placed in layers no greater than 300mm and then be compacted to 98% as measured with the Standard Proctor test.

iv) Compacted Granular backfill shall be placed in layers no greater than 150mm and then be compacted to 98% as measured with the Standard Proctor test.

c) Backfill material shall be rolled down the trench sideslope and shall not be dropped into the trench to avoid cause damage to the pipe or fittings. On vertical trenches the backfill shall be hand placed or placed carefully with equipment by spreading the material in thin lifts at slow rates.

d) In below freezing temperatures the work shall be planned to minimize exposure of the backfill to frost action. Frozen chunks of material shall not be used as backfill.

Any frozen material removed from the trenches shall be replaced with sand or other suitable unfrozen backfill material. The frozen material that is not to be used shall be stockpiled within the limits of the construction site in an area designated by the Engineer.

e) The Contractor shall repair, without cost, all settlements of the backfill material which occur during the maintenance period. This includes, but is not limited to settlement of landscaped areas and the replacement of cracked or damaged sidewalks, asphalt and driveways that occurred as a result of improperly compacted trench backfill and restoration.

88.3.4 WASTE MATERIAL

Soil material excavated from the trench but not installed during the backfilling operation shall be deemed Waste Material. Waste Material shall be transported and installed within the limits of the construction site by the Contractor at the Contractor's expense. Installation of the Waste Material shall be made in accordance with the Grading and Earthwork Specification. The location of Waste Material installation shall be determined by the Engineer.

88.4 TESTING REQUIREMENTS OF THE CONTRACTOR

The contractor shall provide a minimum of 1 field density test every 75m and 1 test for every service trench within the pipe bedding zone.

Field density and bore log results should be submitted as soon as possible after backfill or augering/drilling of the water & sanitary pipes has been completed.

88.4.1 PRE-INSTALLATION

a) Materials

The Contractor shall provide the Engineer and Aquatera copies of sieve analysis of gravel and/or sand that he proposes to supply.

b) Systems
None required.

88.4.2 INSTALLATION

a) Materials
None required.

b) Systems
None required.

88.4.3 POST-INSTALLATION

a) Materials
None required.

b) Systems
None required.

88.5 PAYMENT

Payment shall be full compensation for the procurement of all permits and processes, the supply and the installation of all materials, the supply and use of all equipment, the supply and use of all labour and supervision; and incidentals necessary to complete the work in accordance with these standards.

88.5.1 TRENCHING AND BACKFILLING

Trenching and Backfilling will paid for as one item for the various classes of backfill material and trench depths noted in the tender.

The length of the trench shall be measured as the length (L.M.)of the pipe and fittings assembled in the trench. Where multiple pipes are installed in a single trench then the trench length shall be the length of the longest individual pipe laid. Trench depth shall be measured from the pre-trenching ground surface to the invert of the pipe being installed.

Material brought on site for replacement of frozen soil shall be paid for on a cubic metre (m3) basis. The volume of this replacement material will be measured as compacted in-place. The price will include stockpiling of previously unusable material at a designated site within the construction site.

88.5.2 WASTE MATERIAL

Transportation and installation of waste material shall be considered as part of the trenching and backfilling operation. Payment for Trenching and Backfilling shall include transportation and installation of waste material. No additional payment will be made for waste material.

88.5.3 TESTING REQUIREMENTS OF THE CONTRACTOR

Testing required shall be considered incidental to the Construction Standards.