Part 1 General

1.1 RELATED SECTIONS:

.1 Section 03 30 05 - Cast-in-Place Concrete Short Form.

.2 Section 32 11 23 - Aggregate Base Course.

.3 Section 33 05 14 – Manholes and Catch Basin Structures.

.4 Section 33 41 00 – Storm Utility Drains.

.5 Section 33 46 16 – Subdrainage Piping.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM D 698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft n) (600 kN-m/m n).

.3 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 American Water Works Association (AWWA).

.1 AWWA C206-11 – Field Welding of Steel Water Pipe.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 8.2-M88-CAN/CGSB Sieves, Testing, Woven Wire, Metric

.4 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 1010.PROV (April 2013) Material Specification for Aggregates – Granular A, B, M and Select Subgrade Material.

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock : any solid material in excess of 1.00m ^{3} and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material is not classified as rock.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 The bedrock that will be encountered is from the Palaeozoic age. The bedrock is anticipated to be limestone and interbedded shales of the Verulam formation. It is to be assumed that this bedrock type will have a hardness that would be described as Hard to Very Hard. Rock Quality is to be assumed to be fair to good, with a corresponding minimum RQD of 50% and increasing with depth.. Horizontal joint spacing is assumed with seams with an average spacing of between 200mm and 400mm. The upper 1.0m of the bedrock is assumed to be weathered and/or fractured.

.3 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Approved Native Backfill: excavated site material, free of construction debris, with no stones or rubble larger than 200mm, approved for re-use by Departmental Representative.

.6 Unsuitable materials:

.1 Excessively wet material which can not achieve indicated compaction.

.2 Weak and compressible materials under excavated areas.

.3 Frost susceptible materials under excavated areas.

.4 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM C136 : CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

.5 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

1.4 SUBMITTALS

.1 Make submittals in accordance with Section 01 00 10 – General Instructions.

.2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority.

1.5 PROTECTION OF EXISTING FEATURES

.1 Existing buried utilities and structures:

.1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.2 Prior to beginning excavation Work, notify applicable authorities having jurisdiction, establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.

.3 Confirm locations of buried utilities by careful test excavations in advance of main work.

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.5 Where unknown utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to be paid by Departmental Representative.

.6 Record location of maintained, re-routed and abandoned underground lines.

.7 Confirm locations of recent excavations adjacent to area of excavation.

1.6 EXISTING CONDITIONS

.1 Buried services:

.1 Before commencing work establish location of buried services on and adjacent to site.

Part 2 Products

2.1 MATERIALS

.1 Granular Base material, refer to Section 32 11 23 – Aggregate Base Course

.2 Type 1 Fill:

.1 Approved Native Backfill or select subgrade to OPSS 1010.

.3 Pressure grout: refer to Section 03 30 05 - Cast-in-Place Concrete Short Form.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures. Refer to Section 01 35 43 – Environmental Procedures.

3.2 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement neatly along limits of proposed excavation in order that surface may break evenly and cleanly .

3.3 STOCKPILING

.1 Stockpile fill materials in area indicated.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies, refer to Section 01 35 43 – Environmental Procedures.

3.4 SHORING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Engage Services of qualified Professional Engineer who is registered or licensed in the province of Ontario to design and inspect shoring, bracing and underpinning required for work.

.3 During backfill operation:

.1 Remove shoring from excavations.

3.5 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.4 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.6 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 Do not disturb soil or rock below bearing surfaces.

.3 Remove concrete, paving, and rubble and other obstructions encountered during excavation.

.4 Excavation must not interfere with bearing capacity of adjacent foundations.

.5 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15m at end of day's operation.

.1 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground.

.6 Keep excavated and stockpiled materials safe distance away from edge of trench.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material off site.

.9 Do not obstruct flow of surface drainage or natural watercourses.

.10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.11 Notify Departmental Representative when bottom of excavation is reached.

.12 Obtain Departmental Representative approval of completed excavation.

.13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed Departmental Representative.

.14 Correction of unauthorized over-excavation:

.1 Excavations taken below depths shown without Departmental Representative's written authorization to be filled with granular base material compacted to 95% of maximum density obtained from ASTM D698, refer to Section 32 11 23 – Aggregate Base Course at Contractor's expense.

.15 Hand trim, make firm and remove loose material and debris from excavations.

.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.7 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated. Compaction densities are percentages of maximum densities obtained from ASTM D698 .

.1 Type 1 Fill: to underside of granular sub-base and granular base. Compact to 95%.

3.8 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated and as specified in:

.1 Section 33 05 14 – Manholes and Catch Basin Structures.
.2 Section 33 41 00 – Storm Utility Drains
.3 Section 33 46 16 – Subdrainage Piping.

.2 Place bedding and surround material in unfrozen condition.

3.9 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.
.2 Departmental Representative has inspected and approved of construction below finish grade.
.3 Inspection, testing, approval, and recording location of underground utilities.
.4 Removal of shoring and bracing; backfilling of voids.
.5 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.2 Do not use backfill material which is frozen or contains ice, snow or debris.

.3 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.4 Backfilling around installations.

.1 Place bedding and surround material as specified elsewhere.

.2 Place layers simultaneously on both sides of installed Work to equalize loading.

3.10 CASING BORE PIPE INSTALLATION

.1 Minimum 5 days in advance of drilling operations submit casing bore installation methodology including procedure for insertion of storm sewer pipe into casing and securing storm sewer pipe within casing for review and approval by Departmental Representative. Casing bore operations, including excavations for boring pit, not to proceed until methodology approved by Departmental Representative.

.2 In advance of drilling pilot hole, perform hydro vacuum excavation at all service crossings to verify vertical and horizontal alignment of services. Notify Departmental Representative of any discrepancies and await instruction to proceed.

.3 Drill pilot hole in advance of casing bore. Report any deviation in vertical or horizontal alignment to the Departmental Representative and await approval to proceed. Deviations in excess of allowable tolerances will require re-drilling of the pilot hole, until pilot hole alignment is true to within specified tolerances.

.1 Tolerances:

.1 Storm sewer: in accordance with Open Cut Trench Installation requirements, refer to Section 33 41 00.

.4 Upon completion and approval of pilot hole, drill and install new casing in accordance with approved methodology.

.5 Join ends of casing pipe by butt welding in accordance with AWWA C206.

.6 Insert storm pipe into casing and secure in accordance with approved methodology.

.7 Fill void around carrier pipe and casing with grout. Ensure no pipe movement of carrier pipe during grouting operation.

3.11 SHORTAGE AND SURPLUS

.1 Supply necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.

.2 Dispose of surplus material off site.

END OF SECTION