Part 1 General

1.1 RELATED SECTIONS:

.1 Section 32 11 19 – Granular Sub-Base

.2 Section 32 11 23 - Aggregate Base Course.

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

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 Canadian General Standards Board (CGSB)

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

.3 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS.MUNI 1010-13 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 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.

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

.4 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.

.5 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 Granular Sub-Base material, refer to Section 32 11 19 – Granular Sub-Base.

.3 Type 1 Fill:

.1 Approved Native Backfill or select subgrade material (SSM) to OPSS.MUNI 1010.

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 D98, 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 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.

3.9 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

Part 1 General

1.1 RELATED SECTIONS

.1 Section 32 11 19 - Granular Sub-base.

1.2 REFERENCES

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

- .1 ASTM D4355 - 07 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
- .2 ASTM D4833 - 07 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-4.2 No. 12.2-Amendment 95 -00, Textile Test Methods - Tearing Strength-Trapezoid Method
- .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
  - .1 No. 4-94 - Methods of Testing Geosynthetics - Geotextiles - Normal Water Permeability Under No Compressive Load
  - .2 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.

1.3 SUBMITTALS

.1 Submit samples in accordance with Section 01 00 10 – General Instructions.

1.4 DELIVERY, STORAGE AND HANDLING

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIAL

.1 Geotextile: woven, slit-film polypropylene geotextiles, supplied in rolls.

- .1 Width: 4 m minimum.
- .2 Length: 100 m minimum.
- .3 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure.

.2 Physical properties:

- .1 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
  - .1 Breaking force: minimum 1100 N, wet condition.
  - .2 Elongation at break: maximum 15%.
- .2 Tear Strength: to CAN/CGSB-4.2, No.12.2.
  - .1 Minimum 400 N, wet condition.
- .3 Puncture Strength: to ASTM D4833.
  - .1 Minimum 400 N, wet condition.

.3 Hydraulic properties:

- .1 Apparent opening size (AOS): to ASTM D4751, minimum 400 micrometres.
- .2 Permitivity: to CAN/CGSB-148.1, No. 4.
  - .1 Minimum $0.05s^{-1}$

.4 Factory seams: sewn in accordance with manufacturer's recommendations.

- .1 Equal to or greater than tensile strength of fabric.
- .2 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

.5 Ultraviolet stability: to ASTM D4355.

- .1 Minimum UV Resistance at 500 hours: 70% retained tensile strength.

Part 3 Execution

3.1 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated. Secure in position using methods approved by manufacturer.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile 600 mm over previously laid strip.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 After installation, cover with overlying layer within 4 hours of placement.

.7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.8 Place and compact soil layers in accordance with Section 32 11 19 - Granular Sub-base.

3.2 CLEANING

.1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3.3 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION