PART 1 - GENERAL

1.1 DEFINITIONS

.1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.

.2 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris.

.3 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

1.2 STORAGE AND PROTECTION

.1 Prevent damage to trees, landscaping, bench marks, existing buildings and root systems of trees which are to remain.
.1 Repair damaged items to approval of Consultant.
.2 Replace trees designated to remain, if damaged, as directed by Consultant.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Bituminous based paint of standard manufacture specially formulated for tree wounds.

.2 Soil Material for Fill:
.1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
.2 Remove and store soil material for reused.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

.1 Inspect site and verify with Consultant, items designated to remain.

3.3 CLEARING

.1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.

.2 Clear as indicated directed by Consultant, by cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

.3 Cut off branches and cut down trees overhanging area cleared as directed by Consultant.

.4 Cut off unsound branches on trees designated to remain as directed by Consultant.

3.4 UNDERBRUSH CLEARING

.1 Clear underbrush from areas as indicated at ground level to within mm of ground surface.

3.5 GRUBBING

.1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.

.2 Grub out stumps and roots to not less than 200 mm below ground surface.

.3 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.6 REMOVAL AND DISPOSAL

.1 Chip or mulch and stockpile spread cleared and grubbed vegetative material on site as directed by Consultant.

3.7 FINISHED SURFACE

.1 Leave ground surface in condition suitable for immediate grading operations stripping of topsoil to approval of Consultant.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 32 92 19 - Seeding.

1.2 Site Conditions

.1 Known underground and surface utility lines and buried objects are indicated on site plan.

1.3 Protection

.1 Prevent damage to any landscaping, existing trees, existing pavement, and surface or underground utility lines which are to remain. Make good any damage.

PART 2 - PRODUCTS

2.1 Materials

.1 Fill material: Type 5 in accordance with Part 2 of Section 31 23 33.01 - Excavating Trenching and Backfilling

.2 Obtain approval of excavated or graded material used as fill for grading work. Protect approved material from contamination and freezing.

PART 3 - EXECUTION

3.1 Removal of Topsoil

.1 Remove topsoil from areas to be excavated, paved or regraded. Strip topsoil when dry enough to prevent contamination with sub grade material.

.2 Do not handle topsoil in wet or frozen condition.

.3 Stockpile topsoil on site where directed.
.1 Piles not to exceed 2 m in height.

3.2 Grading

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Slope rough grade away from building 1:50 minimum.

.3 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.4 Compact filled and disturbed areas to corrected maximum dry density maximum dry density to ASTM D698-78, method C D, as follows:
.1 85% under landscaped areas.
.2 100% under paved walk areas.

3.3 Testing

.1 Inspection and testing of soil compaction will be carried out by designated testing laboratory.

.2 Costs of tests will be paid by Owner.

3.4 Surplus Material

.1 Remove surplus material from site.

.2 Remove material unsuitable for fill, grading or landscaping from site.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 32 16 15 - Concrete Walks, Curbs and Gutters.

.2 Section 33 11 16 - Site Water Utility Distribution Piping.

.3 Section 33 42 13 - Pipe Culverts.

1.2 Work Included

.1 This section specifies requirements for furnishing all materials, labour, tools and equipment and performing all operations necessary to complete excavation of all types of material encountered, placing of excavated material as backfill in trenches and embankments, disposal of unsuitable and surplus material and furnishing backfill material as specified below, all as shown on the drawings and as specified; see also Section 31 22 13 - Rough Grading.

.2 The work generally includes, but is not necessarily limited to the following items:
.1 Trench excavation and backfilling for pipelines and appurtenances.
.2 Structure excavation and backfilling.
.3 Control of water by dewatering.
.4 Providing borrow material when required..
.5 Removal and disposal of surplus and/or unsuitable material.
.6 Sheeting, shoring, trench box and bracing to support trench walls, sides of excavations, existing structures or utilities.
.7 Stripping, stockpiling and replacing topsoil.

1.3 Protection of Existing Features

.1 Existing buried utilities and structures:
.1 Size, depth and location of existing utilities and structures as indicated on the drawings are for guidance only. Completeness and accuracy are not guaranteed.
.2 Prior to commencing any excavation work, notify applicable owner or authorities, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.
.3 Confirm locations of buried utilities by careful test excavations.
.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures

encountered as indicated. Obtain direction of Consultant before moving or otherwise disturbing utilities or structures.
.5 Advise Consultant to remove or re-route existing lines in area of excavation not otherwise on drawings. Pay costs for such work.

.2 Existing buildings and surface features:
.1 Conduct, with Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, and paving, survey bench marks and monuments which may be affected by work at no additional cost.
.2 Protect existing buildings and surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.
.3 Where excavation necessitates root or branch cutting, do so only as approved by Consultant.

1.4 Support of Excavation

.1 Suitably slope or properly shore sides of excavations according to site conditions, all in accordance with the Provincial Safety Act. Provide use of support as considered necessary.

.2 The choice of any method of support shall be the responsibility of the Contractor. However, drawings and calculations for the method of support selected, including trench boxes, designed by a qualified professional engineer in accordance with the Provincial safety requirements, are to be submitted to the Consultant for information prior to its use.

.3 If it is desirable that any support, other than that which may be shown on the drawings, be left in the excavations, then the Consultant will issue instructions accordingly.

.4 Take every precaution against slips or falls, but if any should occur, at once make good the same. If any such slip or fall affects or may affect the stability of the permanent work, execute such remedial work as necessary, including filling up of any space left by the slip or fall with approved granular material.

1.5 Samples

.1 At least 1 week prior to commencing work, inform consultant of proposed source of fill materials and provide access for sampling.

.2 Submit samples in accordance with Section 01 33 00 Submittal Procedures.

PART 2 - PRODUCTS

2.1 Materials

.1 Type 1 fill: Class A Under foundations and roads and as required by plans and specifications. When tested in accordance with ASTM C136 and C117 conforms to the following gradation limits with a minimum of 95% of particle remaining on the 4.75 sieve being fractured on one face.

Sieve	% passing
75mm	95-100
19mm	75-95
12mm	60-82
9.5m	56-75
4.75mm	36-61
2mm	16-36
0.425mm	4-10
0.075	3-7

.2 Type 2 Fill: Class B: Under foundations and roads as required by plans and specifications. Select Borrow shall be non-plastic and composed of clean, uncoated particles free from lumps of clay or other deleterious material with a maximum particle size of 100mm and a maximum of 30% of the material passing the 4.75mm sieve shall pass the 75mm sieve. Granular Class B Pit run gravel subbase when tested in accordance with C136 and C116 conforms to the following gradation limits.

Sieve Size	% passing
100	100
75	95-100
25	43-83
19	38-80
12	32-72
9.5	28-66
4.75	19-55
2	9-38
0.425	5-15
0.075	3-8

.3 Type 3 fill: Approved Engineered/Structural fill compacted to 95% of the maximum dry density as determined by the latest version of the standard Proctor test (ASTM D698).

.4 Type 4 fill: clean, washed, coarse sand free from clay shale and organic matter.

Clean Sand Gradation

Clean Sand Gradation

Sieve size	Percent Passing
10 mm	100
2.5 mm	80-90
0.630 mm	25-75
0.315 mm	10-35
0.160 mm	10-17
0.075 mm	0-5

.5 Type 5 fill: Select Borrow shall be non-plastic and composed of clean, uncoated particles free from lumps of clay or other deleterious material with a maximum particle size of 100mm and a maximum of 30% of the material passing the 4.75mm sieve shall pass the 75mm sieve.

.6 Under-Slab Vapour Barrier: Vapour barrier is to be be composed of a reinforced waterproof paper with a polyethylene coating on both surfaces. Use Moistop as manufactured by Fortifiber Corporation, distributed by Arrow Construction Products or approved alternative. Vapour barrier sheet joints are to be lapped no less than 150mm sealed with approved pressure sensitive tape.

.7 Bedding Material: Class C - Pipe zone material shall be clean, hard, sound, durable crushed or pit run gravel or stone, free of shale clay, friable materials, organic matter and other deleterious substances and shall meet the grading limits below when tested in accordance with ASTM C136 and ASTM C117.

Sieve size	Percent Passing
25mm	100
19mm	90-100
12.5mm	0-90
9.5mm	0-60
4.75mm	0-20
2.36mm	0-8
75mm	0-3

PART 3 - EXECUTION

3.1 Site Preparation

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

.2 Strip topsoil from within limits of excavation and stockpile as directed by Consultant, for respreading after backfilling.

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

3.2 Stockpiling

.1 Stockpile fill materials in areas designated by Consultant. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.3 Dewatering

.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 a manner not detrimental to public and private property, or any portion of work completed or under construction.

3.4 Excavation

.1 Excavate to lines, grades, elevations and dimensions indicated or as directed by Consultant.

.2 Excavate in all kinds of materials encountered and make own computations of amounts and nature of excavation required.

.3 Remove concrete masonry paving walks demolished foundations and rubble and other obstructions encountered during excavation.

.4 Excavation must not interfere with normal 45° splay of bearing from bottom of any footing.

.5 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.

.6 For trench excavation, unless otherwise authorized by Consultant in writing, do not excavate more than 30 m(60ft) of trench in advance of installation operations and do not leave open more than 15 m(30ft) at end of day's operation.

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

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

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

.10 Notify Consultant when soil at bottom of excavation appears unsuitable and proceed as directed by Consultant .

.11 Remove unsuitable material from trench bottom to extent and depth directed by Consultant.

.12 Where required due to unauthorized over- excavation, correct as follows:
.1 Fill under bearing surfaces and footings with concrete specified for footings.
.2 Fill under other areas with Type 3 fill compacted to minimum of 98% corrected maximum dry density. (SPMDD)

.13 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Consultant.

.14 Obtain Consultant's approval of completed excavation.

3.5 Excavation and Backfilling Required For Other Trades

.1 Excavating and backfilling for mechanical and electrical work as well as any other trade requiring same within the Extent of Contract Line or as noted, is included in this section and shall be carried out in accordance with provisions specified herein and as indicated. This work is to be laid out and supervised by the trade concerned.

.2 Excavate trenches to lines and grades shown to a minimum of 150 mm(6") below underside of pipe, conduit, cable, or duct. Provide recesses for bell and spigot pipe to ensure bearing will occur along barrel of pipe.

.3 Cut trenches 600 mm(24") wide (or wider where indicated) than maximum pipe width. Trim and shape trench bottoms and leave free of irregularities, lumps, or projections.

3.6 Fill Types and Compaction

.1 Use fill of types as indicated or specified below. Unless otherwise specified, compact to following densities:
.1 Type 1: 95% modifed Proctor.
.2 Type 2: 95% modifed Proctor.
.3 Type 3: 95% modifed Proctor.
.4 Type 4: 95% modifed Proctor.
.5 Type 5: 95% modifed Proctor.

.2 Exterior side of perimeter walls: Use Type 2 fill to subgrade level.

.3 Within building area: Use Type 2 to underside of base course for floor slabs.

.4 Under Light Duty Asphalt Paving:
.1 Provide minimum 150mm Type 1 fill to underside of asphalt.
.2 Provide minimum 300mm Type 2 fill from compacted subgrade to underside of Type 1 fill specified above and as indicated.

.5 Under concrete slabs at entrances to building:
.1 Provide minimum 1000 mm base course of Type 1 fill to underside of 50mm rigid insulation under asphalt walks where indicated. Protect rigid insulation with Type 4 Fill in thickness indicated.

.6 Site Preparation including base and sub-base for foundation and slab:
.1 The placement of base and sub-base for foundation and slab shall be done as per the soils report.

.7 Underground services within building area:
.1 Cradle half diameter of pipe or conduit using Type 4 fill. After pipe or conduit is in place cover with Type 3 fill to underside of sand base course for floor slabs.
.1 Compact bedding and cover to 98% density
.2 Notify Consultant prior to backfilling of trenches.

.8 Site backfill under seeded and sodded areas:
.1 Use Type 5 fill material to bring exterior site up to rough grades required or as indicated.

3.7 Backfilling

.1 Do not proceed with backfilling operations until Consultant has inspected and approved installations.

.2 Areas to be backfilled to be free from debris, snow, ice, water or frozen ground.

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

.4 Backfilling around installations.
.1 Place bedding and surround material as specified elsewhere.
.2 Do not backfill around or over cast-in- place concrete within 24 h after placing.
.3 Place layers simultaneously on both sides of installed work to equalize loading.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Consultant or:

.2 If approved by Consultant erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Consultant.

.5 Place material by hand under, around and over installations until 600 mm of cover is provided. Dumping material directly on installations will not be permitted.

.5 Install drainage system in backfill as indicated or directed by Consultant.

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

3.8 Backfilling Trenches

.1 Backfill trench from top of bedding to top of grades indicated using materials shown on drawings.

.2 place backfill in 300 mm horizontal layers and compact to 95% Standard Proctor density except to 100% Standard Proctor density under existing or proposed asphalt. Thoroughly compact each layer before placing next layer. Carry out compaction tests to demonstrate the effectiveness of backfill thickness per lift versus the number of passes with the selected equipment to achieve the specified compaction.

.3 Provide a letter from a Geotechnical Engineer outlining the thickness per lift, method of compaction to be followed and compaction results.

.4 During backfilling keep trenches free of water at all times and controlled so as to prevent surface water running into excavated areas. Remove silty materials which become wetted and subsequently liquid or extremely plastic.

3.9 Restoration

.1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects noted by Consultant.

.2 Replace topsoil as indicated or directed by Consultant. Reseed grass or sod as indicated.

.3 Clean and reinstate areas affected by work as directed by Consultant.

END

PART 1 - GENERAL

1.1 References

.1 CAN/CGSB-4.2-M88, Textile Test Methods.

.2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Geomembranes.
.1 No. 2-M85, Mass per Unit Area.
.2 No. 3-M85, Thickness of Geotextiles.
.3 No. 7.3-92, Grab Tensile Test for Geotextiles.
.4 No. 6.1-93, Bursting Strength of Geotextiles Under No Compressive Load.

1.2 Samples

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Consultant following samples at least 4 weeks prior to commencing work.
.1 Minimum length of 2 m of roll width of geotextile.

1.3 Mill Certificates

.1 Submit to Consultant copies of mill test data and certificate at least 4 weeks prior to start of work.

1.4 Delivery and Storage

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

PART 2 - PRODUCTS

2.1 Material

.1 Geotextile: woven or non-woven synthetic fibre fabric, supplied in rolls.
.1 Width: 900 mm minimum.
.2 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
.3 For Sediment Control Fence Use: Synthetic Industries Woven Slit Film, Silt Fence #910SC; Terrafence by Terrafix Geosynthetics Inc.; or acceptable alternative.

.4 For Sedimentation Pond Use: Propex Geosynthetics 'Pyramat'; or acceptable alternative.

.2 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, ot-dipped galvanized with minimum zinc coating of 600g/m2 to CAN/CSA G164.

PART 3 - EXECUTION

3.1 Installation

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with pins.

.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 Pin successive strips of geotextile with securing pins at 600 mm interval at mid point of lap.

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

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

.8 Replace damaged or deteriorated geotextile to approval of Consultant.

.9 Provide sediment control fence.

3.2 Protection

.1 No vehicles permitted directly on geotextile.

END