

Part 1 - General

1.1 REFERENCES

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .2 Ontario Provincial Standard Specifications and Drawings (OPSS 805), OPSD-219.110 (Light-Duty Silt Fence Barrier).
- .3 Ontario Regulation 347, as amended.

1.2 DEFINITIONS

- .1 Existing topsoil: Layer of surface soil and vegetation (i.e. grass) present above the subsoil.
- .2 New topsoil: Imported fertile earth composed of a certain quantity of organic matter which promotes the growing of vegetation. Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding. 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 Subsoil: Existing on-site fill material generally composed of silty sand and gravel, present under the topsoil or concrete/asphalt pavement and down to the limestone bedrock. Includes material used under the building's concrete slab-on-grade floors.
- .4 PHC-impacted soil: Existing on-site topsoil and subsoil impacted by PHC above federal and/or provincial standards/criteria (residential land use). The lateral and vertical extents of the PHC-impacted soil are presented on Drawing EN100 – Environmental Soil and Groundwater Management Plan and Drawing EN105 – Environmental Soil and Groundwater Management Details.

1.3 MEASUREMENT PROCEDURES

- .1 Refer to Section 31 23 33.01 – Excavating, Trenching and Backfilling.

1.4 TOPSOIL QUALITY

- .1 Excavated topsoil and non-impacted subsoil can be stockpiled on the site. Only PHC-impacted soil requires off-site disposal at a licensed landfill.

Part 2 - Products

2.1 NOT USED

- .1 Not Used.

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 sediment and erosion control requirements found in Section 01 35 13.43 – Special Project Procedures for Contaminated Sites and the Erosion and Sediment Control Plan submitted as part on the Environmental Protection Plan (Section 01 35 43 – Environmental Procedures).
- .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 STRIPPING OF TOPSOIL

- .1 Ensure that procedures are conducted in accordance with applicable Federal and Provincial requirements.
- .2 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by composting.
- .3 Remove brush from targeted area by non-chemical means and dispose of through mulching.
- .4 Remove topsoil along with the subsoil and/or PHC-impacted soil only in targeted areas.
- .5 Excavated topsoil and non-impacted subsoil can be stockpiled on the site. Only PHC-impacted soil requires off-site disposal at a licensed landfill..
- .6 Follow Drawing EN100 - Environmental Soil and Groundwater Management Plan.

3.3 PREPARATION OF GRADE

- .1 Validate that grades are correct and notify Departmental Representative if discrepancies occur. Do not begin work until confirmed by Departmental Representative.
 - .1 Grade area only when soil is dry to lessen soil compaction.
 - .2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.4 PLACING OF TOPSOIL

- .1 Refer to following drawings:
 - .1 Drawing L1 – Landscape Plan.
 - .2 Drawing L2 – Construction Details.
 - .3 Drawing L3 – Planting Details.

- .2 Place new topsoil only after Departmental Representative has accepted subgrade.
- .3 Spread topsoil during dry conditions in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water.
- .4 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
- .5 Cultivate soil following spreading procedures.

3.5 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 OF SECTION

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PART 1 GENERAL**1.1 RELATED SECTIONS**

- .1 Section 31 23 33.01 - Excavation, Trenching and Backfilling.
- .2 Section 32 01 90.33 - Tree and Shrub Preservation.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 698-91(1998), Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

1.3 EXISTING CONDITIONS

- .1 Examine subsurface logs, and test results which are bound into specification in Appendices Section.
- .2 Known underground and surface utility lines and buried objects are as indicated on site plan.
- .3 Refer to dewatering in Section 31 23 10 - Excavating Trenching and Backfilling.

1.4 PROTECTION

- .1 Protect existing landscaping, bench marks, buildings, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Approved on-site excavated material in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling is suitable for use only below vegetated landscaped areas.
- .2 Approved engineered fill in accordance with Section 31 23 10 Excavating, Trenching and Backfilling is suitable for areas below all walkways, patios, and asphalt paving.

PART 3 EXECUTION**3.1 STRIPPING OF TOPSOIL**

- .1 Strip and stockpile topsoil in accordance with Section 31 14 11 – Earthwork and

Related Work – Short Form.

3.2 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface structures as indicated.
- .2 Rough grade approved fill to following depths below finish grades:
 - .1 150 mm for grassed areas.
 - .2 350mm for perennial and ground cover planting beds
 - .3 350mm for shrub plantings.
 - .4 335mm for walkways and light duty patio areas.
- .3 Slope rough grade away from building as indicated.
- .4 Grade ditches to depth as indicated.
- .5 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.
- .6 Compact filled and disturbed areas to corrected maximum dry density to ASTM D 698, as follows:
 - .1 95% SPMDD under landscaped areas.
 - .2 95% SPMDD under light duty patio and walk areas.
 - .3 100% SPMDD under asphalt paving areas
- .7 Do not disturb soil within branch spread of trees or shrubs to remain.

3.3 TESTING

- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC. Costs of tests will be paid for by the Departmental Representative.

3.4 SURPLUS MATERIAL

- .1 Remove surplus material and material unsuitable for fill, grading or landscaping off site.

END OF SECTION

Part 1 - General**1.1 MEASUREMENT PROCEDURES**

- .1 Quantities of petroleum hydrocarbon (PHC) impacted soil disposed of off of the site will be measured by weight at the approved disposal facility (weight tickets) and paid based on the unit prices stated in the Bid and Acceptance Form.
- .1 Excavated materials will be removed within the following limits:
 - .1 Width for trench excavation as indicated on Drawing EN100 – Environmental Soil and Groundwater Management Plan and on Drawing EN105 – Environmental Soil and Groundwater Management Details, including slopes.
 - .2 Width for excavation for structures as indicated on Drawing EN100 – Environmental Soil and Groundwater Management Plan and on Drawing EN105 – Environmental Soil and Groundwater Management Details, including slopes.
 - .3 Width for excavation for PHC-impacted soil removal as indicated on Drawing EN100 – Environmental Soil and Groundwater Management Plan and on Drawing EN105 – Environmental Soil and Groundwater Management Details, including slopes
 - .4 Depth from ground elevation immediately prior to excavation, to elevation as indicated by Departmental Representative and on Drawing EN100 – Environmental Soil and Groundwater Management Plan and on Drawing EN105 – Environmental Soil and Groundwater Management Details, which is usually bedrock, including slopes.
 - .5 The limits of the PHC impacted area will be determined by the Departmental Representative during excavation works.
- .2 There will be no bedrock excavation/removal.
- .2 The excavation should terminate at bedrock surface, unless otherwise indicated on Drawing EN100 – Environmental Soil and Groundwater Management Plan and on Drawing EN105 – Environmental Soil and Groundwater Management Details and to the satisfaction of the Departmental Representative. Departmental Representative will inspect and approve bottom of excavations.
- .3 Shoring could be left in place, as per Departmental Representative approval.
- .4 Shoring, bracing, cofferdams and underpinning will not be measured separately for payment.
- .5 Backfilling to authorized excavation limits will be measured in cubic metres compacted in place for each type of material specified.
- .6 Placing and spreading of topsoil will be measured for payment in cubic metres calculated from measurements (average in-place thickness times surface area) taken in area of excavation from original location.

- .1 If double handling of topsoil is directed by Departmental Representative (stockpiling and later placing), then quantities will be measured twice; on excavation from original location and on excavation from stockpile.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
 - .2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .5 City of Ottawa Sewer Use By-Law No. 2003-514.
- .6 Ontario Ministry of the Environment, Conservation and Parks (MECP)
 - .1 Ontario Regulation 406/19 - Onsite and Excess Soil Management.
 - .2 Ontario Regulation 903, as amended – Wells.
 - .3 Environmental Activity and Sector Registry (EASR).

1.3 DEFINITIONS

- .1 Excavation classes: only one class of excavation will be recognized (common excavation) since there will be no rock excavation.
 - .1 Rock: limestone bedrock found on the site. Frozen material not classified as rock.

- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .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 Subsoil: Existing on-site fill material generally composed of silty sand and gravel, present under the topsoil or concrete/asphalt pavement and down to the limestone bedrock. Includes material used under the building's concrete slab-on-grade floors.
- .5 PHC-impacted soil: Existing on-site topsoil and subsoil impacted by PHC above federal and/or provincial standards/criteria (residential land use). The lateral and vertical extents of the PHC-impacted soil are presented on Drawings EN100 – Environmental Soil and Groundwater Management Plan and EN105 – Environmental Soil and Groundwater Management Details.
- .6 Waste material: excavated material unsuitable for use in Work or surplus to requirements, including buried waste materials.
- .7 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .8 Recycled fill material: suitable material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .9 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 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 D422 and ASTM C136 : Sieve sizes to 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
 - .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
 - .3 Excavated grass and topsoil in the area of the non-PHC impacted soil may be stockpiled if necessary and re-used on the site. Only PHC impacted soil requires off-site disposal at a licensed landfill.

- .10 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.
- .11 PHC-Impacted soil is soil with concentrations of PHC that exceed the Canadian Council of Ministers of the Environment soil quality guidelines.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Quality Control:
 - .1 Submit survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
 - .2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
 - .3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
 - .4 Submit to Departmental Representative written notice when bottom of excavation is ready to be inspected by Departmental Representative.
 - .5 Submit to Departmental Representative results as described in PART 3 of this Section.
- .3 Preconstruction Submittals:
 - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
 - .2 Submit records of underground utility locates, indicating: location plan of relocated and abandoned services, as required location plan of existing utilities as found in field.
- .4 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 The Contractor shall source fill materials from a licensed quarry and allow the Departmental Representative to collect representative soil samples to confirm soil analytical results of material meets applicable federal guidelines and is deemed Clean Backfill from Pit/Quarry prior to use.
 - .3 If fill material is sourced as excess soil from another property, provide Departmental Representative with supporting documentation in accordance with O.Reg. 406/19. Confirmation that soil concentrations meet the more stringent of those provided in Table 7.1 of O. Reg. 406/19: On-Site and Excess Soil Management (industrial/commercial/community land use) or the CCME guidelines (commercial land use, coarse-textured soil) is required by the Departmental Representative prior to importation of fill as Clean Backfill from Another Property.
 - .4 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of materials and provide access for sampling.
 - .5 Submit 70 kg samples of type of specified material.

- .6 Ship samples to Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .3 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Ontario, Canada.
- .4 Keep design and supporting data on the site.
- .5 Engage services of qualified professional Engineer who is registered or licensed in Ontario, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .6 PHC-impacted soil to be disposed of at an off-site facility, in accordance with Drawing EN100 - Soil and Groundwater Management Plan.
- .7 Provide access to imported fill material from a licensed pit or quarry for Quality Assurance sampling by Departmental Representative throughout work to confirm imported backfill material is considered Clean Backfill from Pit/Quarry.
- .8 Provide Departmental Representative with supporting documentation in accordance with O.Reg. 406/19 for fill imported as Excess Soil from another property to confirm imported backfill material is considered Clean Backfill from Another Property.
- .9 Health and Safety Requirements:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements and Section 01 35 29.14 – Health and Safety for Contaminated Sites.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling and manage excess materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management.
 - .1 Handle and dispose of hazardous materials in accordance with Federal, Provincial and Municipal regulations.
 - .2 Divert excess aggregate materials from landfill to local quarry or recycling facility for re-use as directed by Departmental Representative.
- .2 All PHC-impacted soil to be properly disposed of at an off-site facility, in accordance with Drawing EN100-Environmental Soil and Groundwater Management Plan. PHC soil should be disposed of off-site in a licensed landfill as non-hazardous material.

1.7 REGULATIONS

- .1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with Provincial and Municipal regulations whichever is more stringent.

1.8 TESTS AND INSPECTIONS

- .1 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by Departmental Representative.
- .2 Not later than one week before backfilling or filling, provide to designated testing agency, 23 kg sample of backfill for fill material proposed for use.
- .3 Do not begin backfilling or filling operations until material has been approved for use by Departmental Representative.
- .4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.

1.9 EXISTING CONDITIONS

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Buried services:
 - .1 Before commencing work confirm location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Remove obsolete buried services within specified distances of foundations: cap cut-offs. Perform work as per Drawings.
 - .4 Size, depth and location of existing utilities and structures as indicated on Drawings are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, Contractor to establish location and state of use of buried utilities and structures. Contractor to clearly mark such locations to prevent disturbance during Work.
 - .6 Confirm locations of buried utilities by careful test excavations.
 - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated on Drawings.
 - .8 Record location of maintained, re-routed and abandoned underground lines.
 - .9 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing buildings, structures, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In the event of damage, immediately make repairs as directed by Departmental Representative.
 - .3 Where required for excavation, cut roots or branches in accordance with Section 32 01 90.33 – Tree and Shrub Preservation.

- .4 Protect, where possible, existing groundwater monitoring wells located around building. Monitoring wells located within the proposed excavation footprint, as indicated on drawings, are to be decommissioned as per Ontario Regulation 903, as amended. Refer to Drawing EN100 – Environmental Soil and Groundwater Management Plan.

Part 2 - Products

2.1 MATERIALS

- .1 Granular A/Granular B (Type 1 and 2)/ Select Subgrade Material:
- .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Backfill material cannot contain any concrete, reclaimed or recycled material.
 - .3 OPSS fill material must contain 100% quarried material and cannot contain any Recycled Concrete Material (RCM), Reclaimed Asphalt Pavement (RAP), air-cooled blast-furnace slag or nickel slag and glass or ceramic materials.
 - .4 Acceptable Native Backfill: excavated is acceptable as backfill as long as it is unfrozen and free from rocks larger than 75 mm, cinders, ashes, concrete, asphalt, sods, refuse or other deleterious materials.
 - .5 Clean Backfill from Pit/Quarry: imported fill from a licensed pit or quarry, meeting gradation requirements, that contains concentrations of analyzed parameters less than the CCME guidelines (commercial land use, coarse-textured soil) based on chemical analyses prior to backfilling activities during Contract execution.
 - .6 Clean Backfill from Another Property: imported fill from another property, meeting gradation requirements, that contains concentrations of analyzed parameters less than the more stringent of those provided in Table 7.1 of O. Reg. 406/19: On-Site and Excess Soil Management (industrial/commercial/community land use) or the CCME guidelines (commercial land use, coarse-textured soil) based on chemical analyses prior to backfilling activities during Contract execution.
 - .7 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
 - .8 Table: Gradation Requirements – Percent Passing

Sieve	Granular (Walkways and Parking Areas)			Select Subgrade Material (Softscape)
	A	B		
		Type 1	Type 2	
150 mm	N/A	100	N/A	100
106 mm	N/A	N/A	100	N/A
25 mm	100	50-100	50-100	50-100
19.0 mm	85-100	N/A	N/A	N/A
9.5 mm	50-73	N/A	N/A	N/A
4.75 mm	35-55	20-100	20-55	20-100

2 mm	15-40	10-100	10-40	10-100
400 µm	5-22	2-65	5-22	5-95
74 µm	2-8	0-8	0-10	0-25

- .2 Unshrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength of 0.4 MPa at 28 days.
 - .2 Maximum cement content of 25 kg/m³ with 40 by volume fly ash replacement: to CSA-A3001, Type GU.
 - .3 Minimum strength of 0.07 MPa at 24 h.
 - .4 Concrete aggregates: to CSA-A23.1/A23.2.
 - .5 Cement: Type GU.
 - .6 Slump: 160 to 200 mm.
- .3 Shearmat: honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.

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 submitted and approved sediment and erosion control plan.
- .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 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Protect excavations from freezing.
- .4 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.
- .5 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

- .6 Protect buried services that are required to remain undisturbed.
- .7 Protect groundwater monitoring wells located outside the proposed excavation footprint.

3.4 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated or as directed by Departmental Representative after area has been cleared of brush, weeds and grasses and removed from site.
- .2 Excavated grass and topsoil in the area of the non-PHC impacted soil may be stockpiled if necessary and re-used on the site. Only PHC impacted soil requires off-site disposal at a licensed landfill.

3.5 STOCKPILING

- .1 Stockpiling of excavated topsoil and non-impacted subsoil is permitted on the site. Only PHC-impacted soil requires off-site disposal at a licensed landfill.
- .2 Stockpile imported fill materials in areas designated by Departmental Representative.
 - .1 Stockpile imported granular materials in manner to prevent segregation.
- .3 Protect imported fill materials from contamination.
- .4 Implement sufficient erosion and sediment control measures to prevent sediment release off of construction boundaries and into water bodies.
- .5 Stockpiling to be performed in accordance with Section 01 35 13.43 – Special Procedures for Contaminated Sites.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .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.
 - .1 Where conditions are unstable, Departmental Representative to confirm and advise methods.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .3 Construct temporary Works to depths, heights and locations as directed by Departmental Representative.
- .4 Use trench box or other approved supporting/shoring system for trench/excavation slopes steeper than minimum 1:1 (horizontal : vertical).
- .5 During backfill operation:
 - .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
 - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

- .6 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .7 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from site and restore watercourses as indicated by Departmental Representative.

3.7 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Submit within 15 days of Contract Award a Dewatering Plan for review and approval by Departmental Representative. The Dewatering Plan shall specify the following:
 - .1 Method to dewater the excavation for building demolition.
 - .2 Location of dikes, well points, sheet pile cut-offs and/or sumps to be used.
 - .3 Methods to manage precipitation and run-off.
 - .4 Type of pumps/equipment to be used for dewatering and type of flow meter.
 - .5 Location of discharge to sanitary sewers.
- .3 Avoid excavation below groundwater table if quick conditions or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 43 – Environmental Procedures and Section 01 35 13.43 – Special Project Procedures for Contaminated Sites.
 - .1 Provide and maintain temporary drainage ditches or other diversions outside of excavation limits.
 - .2 The quality of groundwater that may be removed during the demolition activities must be assessed at that time, by the Contractor, to determine if it may be disposed of directly to the municipal sewer without treatment. The Contractor must apply and obtain a discharge agreement from the City of Ottawa as required by the Sewer Use By-Law. The Contractor has the responsibility of obtaining the municipal discharge agreement, as well as meeting all requirements of that agreement, including analytical requirements for the water to be discharged to the sewer.
 - .3 If the daily quantity of pumped excavation water will exceed 50,000 litres per day, the Contractor has the responsibility to apply and register to the MECP's Environmental Activity and Sector Registry, as well as meeting all requirements of that registration, including providing all required technical documents and payment of fees.
- .6 If necessary, provide flocculation tanks, settling basins, or other treatment facilities, as required by sewer discharge agreement, to remove suspended solids or other materials before discharging to sewer.

- .7 Submit within 15 days of Contract Award an Excavation Plan for review and approval by Departmental Representative. The Excavation Plan shall specify the following:
 - .1 The location and depth of open-cut sloped excavation, shored excavation, or other methods.
 - .2 Distances of the stockpiles from the crest of the excavation.
 - .3 For open-cut sloped excavations deeper than 5 m, a slope stability analysis shall be completed by a professional engineer.
 - .4 Method of dewatering and water control for the excavation. The bottom of the excavation must be dry at all times to allow for the compaction of the fill.
 - .5 Specify various inspections required throughout Work to confirm and ensure that conditions of excavations, water control, dewatering and erosion and sediment control measures are safe and consistent with all requirements (including whom, when, how, frequency).

3.8 EXCAVATION

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as per the Drawings and as directed by Departmental Representative.
- .3 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify Departmental Representative when excavations are complete. If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work. Excavation taken below depths shown without Departmental Representative's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.
- .4 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.
- .5 Excavate for slabs and paving to subgrade levels. In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.
- .6 Quantities of excavated topsoil and subsoil (not PHC-impacted) should be minimized as much as feasible.
- .7 Remove demolished foundations and rubble, paving and other obstructions encountered during excavation.
- .8 Excavation must not interfere with bearing capacity of adjacent foundations, parking lots and other structures.
- .9 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

- .10 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 15 m at end of day's operation.
- .11 Keep excavated and stockpiled materials a safe distance away from edge of trench as directed by Departmental Representative. Excavated topsoil and non-impacted subsoil can be stockpiled on the site.
- .12 Restrict vehicle operations directly adjacent to open trenches.
- .13 Dispose of PHC-impacted soil in accordance with Drawing EN-100 Environmental Soil and Groundwater Management Plan.
- .14 Do not obstruct the flow of surface drainage or natural watercourses.
- .15 Earth bottoms of excavations are to be undisturbed soil, level, free from loose, soft or organic matter.
- .16 Notify Departmental Representative when the bottom of excavation is reached and ready to be inspected by Departmental Representative.
- .17 Obtain Departmental Representative approval of completed excavation.
- .18 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .19 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 of undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.9 CONFIRMATORY ENVIRONMENTAL SOIL SAMPLING

- .1 Confirmatory sampling of the soil left in-place may be conducted by the Departmental Representative or another appointed party. As such, the Contractor shall provide any help deemed necessary, if required, to collect the soil samples before proceeding with backfilling activities. The help will be offered by means of assistance from the hydraulic excavator for collecting soil samples.
- .2 Contractor should allow for sufficient time and resources in his schedule for confirmatory soil sampling before backfilling activities and this work will not be measured separately for payment.
- .3 A survey of the final extents of the building excavation must be completed to show where the clean fill is located on the property.

3.10 FILL TYPES AND COMPACTION

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

- .2 OPSS fill material must contain 100% quarried material and cannot contain any Recycled Concrete Material (RCM), Reclaimed Asphalt Pavement (RAP), air-cooled blast-furnace slag or nickel slag and glass or ceramic materials.
 - .1 Engineered fill below softscape finishes:
 - .1 Fill from undisturbed native soil up to underside of topsoil with select subgrade material compacted to 100% SPMDD. If backfill material is to be sourced from any site other than a reputable licensed quarry, it must be characterised in accordance with MECP best practices at the contractors cost with the results outlined in a signed and stamped engineering report to be presented to the Departmental Representative for approval before any backfilling begins.
 - .2 Engineered fill below stone dust pathways/concrete sidewalks/asphalt pathways:
 - .1 1000 mm Granular B from undisturbed native soil to sub-base.
 - .2 300 mm OPSS Granular 'A' base compacted to 100% SPMDD.
 - .3 Engineered fill below heavy duty asphalt roadways:
 - .1 1220 mm Granular B from undisturbed native soil to sub-base, compacted to 100% SPMDD.
 - .2 300 mm OPSS Granular 'B' Type 2 Sub-base compacted to 100% SPMDD.
 - .3 300 mm OPSS Granular 'A' Base compacted to 100% SPMDD.
 - .4 Backfill over services bedding: Granular 'A' with a minimum of 300mm vertical and side cover, compacted to 95% SPMDD.
 - .1 Service trenches in landscape areas: backfill using select subgrade material placed in 300mm thick loose lifts and compacted.
 - .2 Service trenches below paved areas: backfill with Granular A from the top of pipe to within 1200mm of the paved surface, placed in 300mm thick loose lifts and compacted to 95% SPMDD. A minimum of 150mm OPSS Granular A be placed below the pipe invert as bedding material. The upper 1200mm and below the subgrade line are to be backfilled using Granular A, placed in 300mm thick loose lifts and compacted to 95% SPMDD.

3.11 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated in the geotechnical report by Stantec Project No. 122411146.
- .2 Place bedding and surround material in unfrozen condition.

3.12 BACKFILLING

- .1 Use vibratory type compaction equipment.
- .2 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 concrete formwork.
- .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .3 Areas to be backfilled must be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness, unless otherwise indicated, up to grades indicated. Compact each layer before placing succeeding layer.
- .6 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 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 600 mm.
 - .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 Departmental Representative.
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
- .7 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with selected subgrade material compacted as specified for fill.
- .8 Placing:
 - .1 Place backfill, fill and basecourse material in 150 mm lifts, or otherwise indicated. Add water as required to achieve specified density.
- .9 Compaction: compact each layer of material to following densities for material to ASTM D 698:
 - .1 To underside of basecourses: 95%.
 - .2 Basecourses: 100%.
 - .3 Elsewhere: 95%.
- .10 Place recycled fill in areas as indicated.
- .11 Consolidate and level unshrinkable fill with internal vibrators.
- .12 Install drainage system in backfill.

3.13 GRADING

- .1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by the Departmental Representative. Grade to be gradual between finished spot elevations shown on drawings.

3.14 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 – Construction/Demolition Waste Management, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Place imported topsoil as indicated on landscaping Drawings L1, L2 and L3.
- .3 Reinstall lawns to elevation which existed before excavation.
- .4 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by Departmental Representative.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

3.15 SHORTAGE AND SURPLUS

- .1 Supply all 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

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Part 1 - General**1.1 MEASUREMENT AND PAYMENT**

- .1 Supply and installation of geotextile will not be measured separately for payment.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM D4491-99a (2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .3 ASTM D4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - .4 ASTM D4716-08, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - .5 ASTM D4751-04, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-2004, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .1 No. 2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
 - .2 No. 3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
 - .3 No. 6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
 - .4 No. 7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
 - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
- .3 CSA International
 - .1 CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1860-April 2012, Material Specification for Geotextiles.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit following samples 4 weeks prior to beginning Work.
 - .1 Minimum length of 2 m of roll width of geotextile.
 - .2 Methods of joining.
- .4 Test and Evaluation Reports:
 - .1 Submit copies of mill test data and certificate at least 4 weeks prior to start of Work.
- .5 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect geotextiles from direct sunlight, ultra-violet rays, excessive heat, mud, dirt, dust, debris and rodents.
 - .3 Replace defective or damaged materials with new.
- .3 Packaging Waste Management: remove for reuse of packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 21 – Construction/Demolition Waste Management.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for re-use and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

- .3 Collect and separate for disposal paper, plastic, polystyrene, 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: non-woven synthetic fiber fabric, supplied in rolls.
 - .1 Width: 3.0 m minimum.
 - .2 Length: 40.0 m minimum.
 - .3 Composed of: minimum 95% by mass of polypropylene, polyethylene, polyester, or other synthetic polymers with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure.
- .2 Physical properties:
 - .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 6 mm.
 - .2 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 109 g/m².
 - .3 Tensile strength and elongation (in any principal direction): to ASTM D 4595.
 - .1 Tensile strength: minimum 355.86 N, wet condition.
 - .2 Elongation at break: maximum 50%.
 - .3 Seam strength: same or greater than tensile strength of fabric.
 - .4 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
 - .1 Breaking force: minimum 355.86 N, wet condition.
 - .2 Elongation at future: maximum 50%.
- .3 Hydraulic properties:
 - .1 Apparent opening size (AOS): to ASTM D 4751, 212 micrometres.
 - .2 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10, OPSS 1860.
 - .3 Permittivity: to ASTM D 4491, 2.2 pers.
 - .4 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.

Part 3 - Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: confirm that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with stakes, pins or stones.
- .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 300mm 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 1 hour of placement.
- .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .9 Place and compact soil layers in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .3 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

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