

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C127-04, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .3 ASTM D1557-02e1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - .4 ASTM D4253-00, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.2 DEFINITIONS

- .1 Corrected maximum dry density is defined as:
 - .1 $D = D1 \times D2 / (F1 \times D2) + (F2 \times D1)$
 - .2 $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
 - .3 Where: D = corrected maximum dry density kg/m³.
 - .1 F1 = fraction (decimal) of total field sample passing 19 / 4.75 mm sieve
 - .2 F2 = fraction (decimal) of total field sample retained on 19 / 4.75 mm sieve (equal to 1.00 - F1)
 - .3 D1 = maximum dry density, kg/m³ of material passing 19 / 4.75 mm sieve determined in accordance with Method A C of ASTM D698 ASTM D1557.
 - .4 D2 = bulk density, kg/m³, of material retained on 19 / 4.75 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.
 - .4 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 dry method wet method when directed by Contract Administrator.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.2 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Allow continual sampling by Contract Administrator during production.
- .3 Provide Contract Administrator with access to source and processed material for sampling.
- .4 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.3 LEED REQUIREMENTS

- .1 See Section 01 35 21 - LEED Requirements.
- .2 LEED Submittals: Submit LEED supporting documentation in accordance with Section 01 35 21 - LEED Requirements.
- .3 Waste Management and Disposal: Dispose of packaging and waste materials in appropriate on-site bins for recycling and disposal in accordance with Section [01 74 21 - Construction/Demolition Waste Management and Disposal].

Part 2 Products

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed five times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Natural sand.
 - .2 Manufactured sand.
 - .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

- .1 Crushed rock.
- .2 Gravel and crushed gravel composed of naturally formed particles of stone.
- .3 Light weight aggregate, including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

- .1 Inform Contract Administrator of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.
- .2 If, in opinion of Contract Administrator, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
- .3 Advise Contract Administrator 4 weeks in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 PREPARATION

- .1 Topsoil stripping
 - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 - .2 Begin topsoil stripping of areas after area has been cleared of brush weeds and grasses and removed from site.
 - .3 Strip topsoil to depths required. Avoid mixing topsoil with subsoil.
 - .4 Stockpile height not to exceed 2 m.
- .2 Aggregate source preparation
 - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Contract Administrator .
 - .2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
 - .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
 - .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
 - .5 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .3 Processing
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

- .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Contract Administrator.
- .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Contract Administrator.
- .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- .4 Handling and Transport:
 - .1 To avoid segregation, contamination and degradation.
- .5 Stockpiling
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Contract Administrator. Do not stockpile on completed pavement surfaces.
 - .2 Stockpile aggregates in sufficient quantities to meet Project schedules.
 - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
 - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
 - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
 - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Consultant within 48 h of rejection.
 - .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Max 1.5 m for coarse aggregate and base course materials.
 - .2 Max 1.5 m for fine aggregate and sub-base materials.
 - .3 Max 1.5 m for other materials.
 - .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
 - .9 Do not cone piles or spill material over edges of piles.
 - .10 Do not use conveying stackers.
 - .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Consultant.
- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

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.

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 requirements of sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .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 Provincial and Municipal requirements.
- .2 Roto till existing sod into area to be stripped.
- .3 Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .4 Handle topsoil only when it is dry and warm.
- .5 Remove brush from targeted area by non-chemical means and dispose of through mulching.
- .6 Strip topsoil to depths as directed by Contract Administrator.
 - .1 Avoid mixing topsoil with subsoil.
- .7 Pile topsoil in berms in locations as directed by Consultant.

- .1 Stockpile height not to exceed 2 m.
- .8 Protect stockpiles from contamination and compaction.
- .9 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

3.3 PREPARATION OF GRADE

- .1 Verify that grades are correct and notify Contract Administrator if discrepancies occur. Do not begin work until instructed by Contract Administrator.
 - .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 Place topsoil only after Contract Administrator has accepted subgrade.
- .2 Spread topsoil during dry conditions in uniform layers not exceeding 200 mm, over unfrozen subgrade free of standing water.
- .3 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
- .4 Cultivate soil following spreading procedures.

3.5 SUB-SOILING

- .1 Apply sub-soil, following spreading and cultivating procedures to designated areas to improve drainage and agricultural potential of soil.
- .2 Work sub-soil area following natural grade contour lines, with vibrating sub-soiler to depth of 40 cm.
- .3 Cross sub-soil the area following the first pass.
- .4 Cultivate the soil with a chain harrow to de-clod the soil.

3.6 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

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D698-91(1998), Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ;).

1.2 EXISTING CONDITIONS

- .1 Examine subsurface investigation report which is bound into specification.
- .2 Known underground and surface utility lines and buried objects are as indicated on site plan.
- .3 Refer to dewatering in Section 31 23 33.01 - Excavating Trenching and Backfilling.

1.3 PROTECTION

- .1 Protect and/or transplant existing fencing, trees, landscaping, natural features, buildings, pavement, surface or underground utility lines which are to remain as directed by Contract Administrator. 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 Fill material: Type in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Contract Administrator.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Contract Administrator.
- .2 Commence topsoil stripping of areas as indicated after area has been cleared of brush, weeds, and grasses and removed from site.
- .3 Strip topsoil to depths as indicated. Rototill weeds and grasses and retain as topsoil on site. Avoid mixing topsoil with subsoil.

- .4 Stockpile in locations as directed by Contract Administrator. Stockpile height not to exceed 2 m.
- .5 Dispose of unused topsoil as directed by Contract Administrator.

3.2 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Slope rough grade away from building as indicated.
- .3 Grade ditches to depth as indicated.
- .4 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.
- .5 Compact filled and disturbed areas to corrected maximum dry density maximum dry density to ASTM D698, as follows:
 - .1 85% under landscaped areas.
 - .2 95 % under paved and walk areas.
- .6 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 Contract Administrator. Refer to Sections 01 29 83 - Payment Procedures and 01 45 00 - Quality Control.
- .2 Submit testing procedure, frequency of tests, testing laboratory as designated by ULC or certified testing personnel to Contract Administrator for review.

3.4 SURPLUS MATERIAL

- .1 Remove surplus material and material unsuitable for fill, grading or landscaping as directed by Contract Administrator.

END OF SECTION

Part 1 General

1.1 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 C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-632002, 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/ft ;) (600 kN-m/m ;).
 - .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ;) (2,700 kN-m/m ;).
 - .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 Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-December 2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System For New Construction and Major Renovations.
- .4 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium.
 - .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.
- .5 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.

1.2 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock : solid material in excess of 0.25 m³ ; and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. 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 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 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.
- .8 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.

1.3 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert excess aggregate materials from landfill to local recycling facility for reuse.

1.5 EXISTING CONDITIONS

- .1 Examine soil report attached to the Specifications.

- .2 Buried services:
 - .1 Before commencing work verify 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 2 m of foundations: cap cut-offs.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, notify applicable authorities having jurisdiction establish location and state of use of buried utilities and structures. And 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.
 - .8 Where utility lines or structures exist in area of excavation, obtain direction of Contract Administrator before removing or re-routing.
 - .9 Record location of maintained, re-routed and abandoned underground lines.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Contract Administrator, condition survey of existing buildings, 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 event of damage, immediately make repair as directed by Contract Administrator

Part 2 Products

2.1 MATERIALS

- .1 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
 - .3 Table:

Sieve Designation	% Passing	
	Type 1	Type 2
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85

Sieve Designation	% Passing	
	Type 1	Type 2
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

- .2 Type 3 fill: selected material from excavation or other sources, approved by Contract Administrator for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 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.
- .5.4 Shearmat: honeycomb type bio-degradable cardboard 200 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 requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .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 in accordance with Section 02 41 13 - Selective Site Demolition.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Contract Administrator approval.
- .4 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.
- .5 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

- ~~.4.1~~ See Section 31 14 13 – Soil Stripping and Stockpiling

3.5 STOCKPILING

- .1 Stockpile fill materials in areas designated by Contract Administrator.
 - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods.
- .2 During backfill operation:
 - .1 Unless otherwise indicated or directed by Contract Administrator, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.

3.7 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .3 Protect open excavations against flooding and damage due to surface run-off.

- .4 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved areas 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.

3.8 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Remove concrete, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 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.
- .5 For trench excavation, unless otherwise authorized by Contract Administrator 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.
- .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 in accordance with Waste Management Plan.
- .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 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.

3.9 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 in accordance with Section 31 05 10 - Corrected Maximum Dry Density for Fill.
 - .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

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

- .2 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

- .1 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 150mm compacted thickness. Compact each layer before placing succeeding layer.
- .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 hours after placing of concrete.
 - .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.
 - .2 If approved by Contract Administrator, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Contract Administrator.
- .5 Place unshrinkable fill in areas as indicated.
- .6 Consolidate and level unshrinkable fill with internal vibrators.
- .7 Install drainage system in backfill as indicated.

3.12 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 - Construction/Demolition Waste Management and Disposal, trim slopes, and correct defects as directed by Contract Administrator.
- .2 Replace topsoil as indicated.
- .3 Reinstate lawns to elevation which existed before excavation.
- .4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstate areas affected by Work as directed by Contract Administrator.
- .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.

END OF SECTION

Part 1 General

- .1 This section specifies requirements for the supplying and installation of erosion and sediment control materials to prevent waste excavated material, sedimentation, and debris from construction operations from entering main drainage channels during construction activities, rainfall and related run-off events.

1.2 REFERENCES

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada for New Construction Version 1.0 Reference Guide
- .2 United States Environmental Protection Agency (USEPA)
 - .1 EPA 832/R-92-005 (September 1992) Storm Water Management for Construction Activities, Chapter 3

Part 2 MATERIALS

2.1 Silt Fencing

- .1 Silt Fencing to be polypropylene synthetic fibre fabric with ultraviolet stabilizers.
 - .1 Amoco 1198 or approved equal.
- .2 The fabric shall be inert to commonly encountered soil chemicals, hydrocarbons, mildew and bacteria.
- .3 The minimum value (weakest principal direction) for strength properties of any individual roll tested from the manufacturing lot or lots of a particular shipment shall be in excess of the minimum value (weakest principal direction) stipulated herein.
- .4 Physical Properties (based on minimum average roll values):
 - .1 Grab tensile: to ASTM D4632, 1.33 kN in machine direction, 0.89kN in cross machine direction.
 - .2 Grab Elongation: to ASTM D 4832 15%.
 - .3 Mullen Burst Strength: to ASTM D-3786, 3100 kPa..
 - .4 Puncture Resistance: to ASTM D 4833, 0.53 kN.
 - .5 Trapezoid Tear Strength: to ASTM D4533, 0.28 kN .
 - .6 UV Resistance: to ASTM D 4355, 90%.@ 500 hrs.
 - .7 Apparent Opening Size: to ASTM D 4751, 0.43 mm.
 - .8 Flow Rate: to ASTM D 4491, 1,420 l/min/m2 .
 - .9 Permittivity to ASTM D 4491, 0.5 sec-1.
- .5 Wood Posts: 38 mm x 89 mm (2" x 4"), pointed at one end.

2.2 Erosion control blankets

- .1 Biodegradable 70% straw and 30% coconut fibre erosion control blanket
 - .1 ErosionControlBlanket SC32 or approved equal.
- .2 Blanket mass/unit area: 270 g/m²
- .3 Netting - black UV stabilized polypropylene: 15.9 X 15.9 mm
- .4 Netting weight: 14.6 grams/m²
- .5 Thread: white or brown UV stabilized polypropylene 850 dtex
- .6 Location: bottom of ditches.

2.3 Stenlog

- .1 Photodegradable
- .2 225 mm diameter
- .3 Manufacture: ErosionControlBlanket or approved equal.

2.4 Crushed Stone

- .1 Washed gravel or crushed stone consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
- .2 The size of the screened gravel is to be a minimum of 19 mm and a maximum of 64 mm.
- .3 Crushed rock is to be 19 mm.

Part 3 Execution

3.1 Silt Fence Installation

- .1 Install silt fences as per manufacturers recommendations and in accordance with details shown on the plans.
- .2 Excavate trench to place bottom of fabric a minimum of 150 mm below existing grade and backfill with compacted soil to prevent sediment flow underneath the silt fence.
- .3 Install all supporting posts on the down slope side of the fencing.
- .4 Maintain silt fences throughout construction to ensure they are controlling sediments from the construction site until vegetation is established.
 - .1 Silt fences and filter barriers shall be inspected weekly after each significant storm (1 inch (25.4 mm) in 24 hours). Any required repairs shall be made immediately.

- .2 Sediment should be removed when it reaches 1/3 height of the fence or 9 inches (0.3 m) maximum. The removed sediment shall conform to the existing grade and be vegetated or otherwise stabilized.
- .5 Complete sodding and landscaping as soon as weather conditions permit upon completion of construction.
- .6 Remove silt fences after installation of all permanent erosion control measures (including satisfactory establishment of sod and vegetation) and prior to project close out.

3.2 Erosion Control Blanket

- .1 Place erosion control blanket on disturbed soil underneath and immediately downstream of roof downspouts.
- .2 Install erosion control blanket in accordance with manufacturers recommendations by stapling in place and as per details shown on the plans.
- .3 Ensure complete contact of the protection matting with the soil by removing all rocks, clods, vegetative or other obstructions
- .4 For installation on slopes begin at the top of the slope and anchor its blanket in a 150mm deep x 150mm wide trench. Backfill trench and tamp earth firmly.
- .5 Unroll blanket down-slope in the direction of the water flow.
- .6 Lap edges in accordance with manufacturer's instructions.
- .7 All blanket and mats should be inspected periodically following installation.
- .8 Inspect installation after significant rainstorms to check for erosion and undermining. Any failure should be repaired immediately.
- .9 If washout or breakage occurs, re-install the material after repairing the damage to the slope or drainage way.

3.3 Stenlogs

- .1 Install the Stenlog around catch basin grates in circular shape
- .2 Install wooden stakes in the stenlog at 0.60 metre on center leaving less than 3-5 cm of stake exposed above the stenlog.
- .3 Maintain isolation measures until sediments are completely settled out or sediment contaminated water has been pumped through a filtering system before re-entering the water course.

END OF SECTION

Part 1 GENERAL

1.1 SEDIMENT & EROSION CONTROL PLAN

- .1 This plan has been established to clearly define the minimum practices which must be employed at Sinclair Community Centre to prevent soil erosion and to prevent sedimentation from leaving the site or entering waterways. This Plan defines the strategies and project specific requirements to ensure implementation.
- .2 Implementation measures are based on the Environmental Protection Agency Standard #832/R-92-005 Chapter 3, Storm water Management for Construction Activities.
- .3 The construction jobsite and areas surrounding are to be kept clean, dust free and debris free. The existence of water contaminants and sediment entry points are unacceptable.

1.2 SITE CONDITIONS

- .1 General: The existing site is 39,170m², of which approximately 9,000m² consists of the proposed site development area around the building location.
 - .1 An existing hockey rink exists on the north side of the building. The hockey rink is not affected by the proposed work and will remain.
 - .2 The south side of the building is adjacent to Church Avenue. The sidewalk is outside the property line.
 - .3 The existing parking lot to the east of the building will remain.
 - .4 The existing baseball diamond to the west of the building will be removed and replaced with sod.
- .2 Existing site characteristics:
 - .1 The site consists of an existing building surrounded by gently graded grass, gravel and asphalt areas.
 - .2 The existing site is not located near any naturally vegetated areas or drainage systems.
 - .3 There are no steeply graded areas and no runoff traversing the site.
- .3 Existing site drainage patterns: Runoff from the existing building and immediately surrounding area flows in three directions, each of which has a catch basin to receive the storm water runoff:
 - .1 South towards Church Avenue,
 - .2 East into the on-site existing parking area,
 - .3 West and north-west towards asphalt and a baseball diamond area.
- .4 The new storm-water management strategy decreases overall site imperviousness from 47% to 45% by reducing asphalt and gravel surfaces and increasing sodded areas. Building drainage will be redirected towards pervious areas instead of impervious areas to reduce the amount of water entering the City storm-water system.
 - .1 Drainage Southwards towards Church Avenue will be reduced.

- .2 Drainage Eastwards into the existing parking area will be reduced.
- .3 The existing baseball diamond will be decommissioned and replaced with sod. Building drainage will be directed towards the newly sodded area, which is gently graded away from the building.

1.3 IMPLEMENTATION STRATEGIES

- .1 General measures:
 - .1 Install all sediment controls prior to any soil disturbing activities. Coordinate placement of structural control methods with drawings and specifications.
 - .2 Prior to any construction, the sump of each catch basin should be vacuumed out. Sumps must be kept clean throughout construction.
 - .3 Truck traffic to and from the site may deposit soil onto the site approach and staging areas.
 - .1 The Contractor must keep these areas clean of dirt and debris.
 - .2 The Contractor must remain vigilant that all equipment leaving site is clean and does not track mud and debris off site. During concrete pouring and general demolition stages, all equipment must be individually inspected for cleanliness.
 - .3 All hauling and demolition trucks must be fitted with covers. Covers must be closed before the trucks leave site.
 - .4 All stockpiles of top soil, sand, etc. should be well contained and covered with an anchored tarp.
- .2 Minimize disturbed soil:
 - .1 Phase construction activities to minimize the amount of area disturbed at one time. Allow completed areas to be stabilized and re-vegetated before disturbing adjacent sites.
 - .2 Limit construction equipment to designated areas of work to control soil compaction. Keep equipment away from existing trees and infiltration basins.
 - .3 No part of the site may be disturbed and left unused without the implementation of temporary or permanent control measures.
 - .4 Phase and coordinate work to permit immediate implementation of permanent erosion control measures as quickly as possible. The need for temporary erosion control measures may be avoided by installing permanent erosion control measures.
 - .1 Sod Stabilization: The decommissioning of the baseball diamond must be coordinated to permit placement of new sod immediately upon removal of existing granular materials.
 - .2 Sod Stabilization: Coordinate prompt placement of new sod and permanent landscaping materials after completion of construction activities.
 - .5 Place erosion control blankets at existing, temporary or future downspout locations to prevent erosion of existing soil. See site drawings and Section 31 25 00 – Erosion and Sedimentation.
- .3 Remove sediment from onsite runoff prior to runoff leaving site:

- .1 Construct a silt fence on the south property line (adjacent to Church Ave.) to control runoff from the site. See site drawings and Section 31 25 00 – Erosion and Sedimentation.
- .2 Install sten-logs arranged in a circular shape around all catch-basins. See site drawings and Section 31 25 00 – Erosion and Sedimentation.
- .3 Install rock filter on curb inlet grating. See site drawings and Section 31 25 00 – Erosion and Sedimentation.
- .4 In keeping with the project drainage strategy, reasonable attempt should be made during construction phases to drain water in a north-westerly direction towards sodded areas. Do not drain water towards construction areas (e.g. excavations) or impervious areas. (e.g. parking lot.)

1.4 CONTROL MEASURES

- .1 Specific controls have been chosen specifically for erosion and sedimentation control for this project and site. Stabilization and structural controls will comply with EPA #832/R-92-005 Chapter 3, Storm water Management for Construction Activities. Reference site drawings and specification Section 32 25 00 – Erosion and Sedimentation for product information and site placement.
 - .1 **PERMANENT SEEDING AND PLANTING** - Permanent seeding holds soil in place by planting grass, trees or shrubs. This stabilization control measure will be used to reduce erosion by slowing down the velocity of runoff and permitting greater soil infiltration when areas will no longer be disturbed by further construction activities.
 - .2 **EROSION CONTROL BLANKETS** – Protects underlying soil in disturbed areas from erosion until permanent Sod stabilization can be implemented. This measure will be implemented under temporary and permanent roof downspout locations to disperse and slow concentrated water flow while preventing loss of soil.
 - .3 **SILT FENCES** - Silt fences are used on down slope or side slope areas of the site. They are a temporary boundary that consists of a filter fabric stretched along posts anchored into the ground. Water is able to pass through the fabric while debris is trapped on the uphill side of the fence. They will be used to reduce the amount of sediment which is removed from the site due to overland flow.
 - .4 **STORM DRAIN INLET PROTECTION** - Storm drain inlet protection is a sediment filter or depressed area around a storm sewer inlet. The protection allows run off to pool or be filtered before it enters the storm sewer. Inlet protection will be used at all storm drains (catch basins) to ensure filtration.

1.5 INSPECT AND MAINTAIN CONTROLS

- .1 **INSPECT:** According to EPA General Permit, inspection is required every 7 days or within 24 hours of precipitation 1.27 cm or more. The entire site, including material storage areas, vehicular entryways, control measures and disturbed areas must be inspected.
- .2 **MAINTAIN:** After inspection the contractor must record any damages or deficiencies noticed. Damaged or deficient controls should be corrected no later than 7 days after inspection. Within 24 hours, clean out silt fences when they are 1/3 full of sediment, and sediment basins when 1/2 full.

- .3 **RECORD:** Records should be kept of major activities such as grading, construction and area stabilization. These records should include the date and location of these activities.

END OF DOCUMENT

Part 1 General

1.1 REFERENCES

- .1 CSA Standard CSA-A23.1-04 (Concrete Materials and Methods of Concrete Construction)
- .2 CSA Standard CSA-A23.2-04 (Methods of Test for Concrete)

1.2 QUALITY ASSURANCE

- .1 All piling work shall conform to the following standards
 - .1 Current edition of applicable Building Code
 - .2 CSA Standard CSA-A23.1-04 (Concrete Materials and Methods of Concrete Construction)
 - .3 CSA Standard CSA-A23.2-04 (Methods of Test for Concrete)

1.3 QUALIFICATIONS OF DESIGN BUILDER

- .1 Piling shall be performed by firms that have no less than 3 years experience in the installation of the types of piles specified for this project.

1.4 SOIL INVESTIGATION

- .1 A report on the soil conditions of the site id attached to the specification.
- .2 Examine the Soils Report and note all conditions affecting this work.
- .3 Soil investigation data is provided only for information and the convenience of bidders. The City and Consultant disclaim any responsibility for the accuracy, true location and extent of the soils investigation that has been prepared by others. They further disclaim responsibility for interpretation of the data by bidders, as in project soil-bearing values, rock profiles, soil stability and the present level and extent of underground water.
- .4 The Contractor shall inspect the site and satisfy himself as to the nature and location of the Work. Verify all dimensions at the site.

1.5 INSPECTION

- .1 A soils engineer in the employ of the Contractor shall inspect and approve all borehole depths and conditions before the Contractor is allowed to place concrete. Failure to comply with this clause may be the cause for rejection of the pile. If removal is required it shall be done at the Contracto's expense.
- .2 Notify Consultant and secure approval before placing reinforcing steel and concrete. Issue at least 72 hours notice to the Consultant or his approved Inspection Engineer, when inspection will be required.

- .3 Concrete tests will be required in accordance with CSA Standard A23.2-04. If concrete at 28 days is less than required strength, provide whatever additional foundation is required, as directed, to satisfactorily support the same load at same point as called for on the drawings without additional cost to the City.

1.6 DESIGN CRITERIA

- .1 Refer to the geotechnical report for recommended design criteria. Piling contractor assumes design responsibility and risk of interpretation of geotechnical report.
- .2 Refer to geotechnical report for recommended pile embedment lengths.

1.7 SPECIAL PROTECTION

- .1 If ambient temperature during seven days after placing may fall below 5 degrees Celsius, cover top of each unit with 300 mm depth of loose straw or approved equivalent in accordance with B6 Substitutes and comply with protection requirements of CSA A23.1-04.

1.8 LEED REQUIREMENTS

- .1 See Section 01 35 21 - LEED Requirements.
- .2 LEED Submittals: Submit LEED supporting documentation in accordance with Section 01 35 21 - LEED Requirements.
- .3 Waste Management and Disposal: Dispose of packaging and waste materials in appropriate on-site bins for recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .4 Recycled Content: Supply building materials with recycled materials (post consumer plus ½ post-industrial content) in accordance with LEED Materials and Resources Credits MR 4.1 & 4.2 – Recycled Content.
- .5 Regional Materials: Supply building materials that are regionally extracted, harvested, or recovered within 800km of the project location when shipped by truck, or within 2400km of the project location when shipped by rail, in accordance with LEED Materials and Resources Credit MR 5.1 & 5.2 – Regional Materials.

Part 2 Products

2.1 GENERAL

- .1 See the Structural Drawings for further information.
- .2 In any situation where the specifications do not agree with the specifications or intent of the Structural Drawings or the Geotechnical Report:
- .1 The Structural Drawings and Geotechnical Report shall govern.
- .2 The Consultant must be alerted, whom will then confirm requirements.

2.2 MATERIALS

- .1 All materials forming part of the piles shall be as indicated on the Structural Drawings and in accordance with Section 03 30 00 – Cast In Place Concrete, Section 03 20 00 Concrete Reinforcement.
- .2 Supplementary cementing materials: to CSA A3001.
 - .1 Portland Cement Reduction: Target 30% or greater within structural parameters.
- .3 Regional Materials: Concrete to meet Regional Materials requirements.

2.3 SOURCE QUALITY CONTROL

- .1 Mill report to CAN/CSA-S16.
- .2 Concrete tests: to CSA-A23.1/A23.2.

Part 3 Execution

3.1 GENERAL

- .1 All boreholes shall be placed to dimensions and depths indicated on the drawings. Depths are measured from existing grade.
- .2 Sloughing and/or ground water seepage can be anticipated during the drilling operation. The Contractor must review the geotechnical report and make his own estimate of casing requirements to maintain the boreholes in an acceptable condition for concrete placing.
- .3 All concrete shall be placed so as to avoid segregation and displacement of reinforcing. Placement of concrete shall be in one, continuous operation.
- .4 Piles shall be installed with a maximum of 2% off plumb and not more than 75mm off location.
- .5 Concrete cut-off elevation shall be to the following tolerances: plus 25mm minus 75mm.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.3 BORING

- .1 Machine bore piles to depth required, circular and full diameter noted, clean bottoms to obtain complete satisfactory bearing, as determined by the geotechnical inspector. Remove stones (up to 200 mm greatest dimension), boulders over 300mm and rock in whole or in part before boring. Tool and clean hole to ensure that machine auger has reached required depth. If after repeated attempts of cleaning the base of a belled pile with the bell tool are unsuccessful, down-hole hand cleaning will be required. In such cases, the minimum shaft

diameter should be in accordance with local regulations to facilitate the installation of casing in order to permit manned entry into the pile shaft.

3.4 PLACING CONCRETE AND STEEL

- .1 Securely fasten steel during concrete placement. Allow for 75 mm cover.
- .2 Bring top of each unit to level but roughened surface at elevation shown on plans, and form proper seating for structural work it is intended to support. Each unit shall be vibrated with approved mechanical vibrator.

3.5 FIRM BID

- .1 This section of the contract shall be quoted as a firm price for design and installation of the piles through and under any subsurface condition encountered. All information given on drawings or in this specification is for the Contractor's information only and he is not to satisfy himself as to existing conditions.

3.6 EXCAVATED MATERIAL

- .1 As work proceeds, clean up and removal of all excavated materials and debris. Leave site and all roads or other means of access to site clean and clear of spillage.

3.7 DEFECTIVE PILES

- .1 Cased concrete shaft piles rejected where:
 - .1 Soil has entered casing.
 - .2 Water has entered casing.
 - .3 Casing is damaged, out of tolerance or alignment.

3.8 FIELD QUALITY CONTROL

- .1 Field Records: maintain driving record for each shell, including elevation of bedrock, driven depth of pile, cut-off elevation of shell and protruding core.

3.9 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