

Part 1 General

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .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.

1.3 DEFINITIONS

- .1 Corrected maximum dry density is defined as:
 - .1 $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
 - .2 Where: D = corrected maximum dry density kg/m
 - .1 F1 = fraction (decimal) of total field sample passing 19mm sieve
 - .2 F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)
 - .3 D1 = maximum dry density, kg/m³ of material passing 19 mm sieve determined in accordance with Method A of AST MD698.
 - .4 D2 = bulk density, kg/m³, of material retained on 19 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.
 - .3 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 dry method when directed by Departmental Representative .

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM D4791-[10] , Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .2 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

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 aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Allow continual sampling by Departmental Representative during production.
 - .2 Provide Departmental Representative with access to source and processed material for sampling.
 - .3 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
 - .4 Provide front end loader or other suitable equipment including trained operator for stockpile sampling as necessary. Move samples to storage place as directed by Departmental Representative .
 - .5 Supply new or clean sample bags or containers according appropriate to aggregate materials.
 - .6 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
 - .7 Provide water, electric power and propane to Departmental Representative laboratory trailer at production site.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused granular materials from landfill to local facility as approved by Departmental Representative

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.
- .2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.
- .3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

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, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed 5 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, boulder, 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 Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise Departmental Representative 4 weeks minimum 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 EXAMINATION

- .1 Verification of Conditions: verify that conditions are acceptable for topsoil stripping.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with topsoil stripping only after unacceptable conditions have been remedied and approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Processing:
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.
 - .1 Use methods and equipment approved in writing by Departmental Representative.
- .2 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.
- .3 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
- .4 Stockpiling:
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative . 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 Departmental Representative within 48 hours of rejection.
 - .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Maximum 1.5 m for coarse aggregate and base course materials.
 - .2 Maximum 1.5 m for fine aggregate and sub-base materials.
 - .3 Maximum 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.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning .
- .3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed by [Departmental Representative] [DCC Representative] [Consultant] .
- .5 Waste Management: separate waste materials for recycling, reuse in accordance with Section 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Not Used

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

- .1 Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .2 Handle topsoil only when it is dry and warm.
- .3 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by alternative disposal .
- .4 Remove brush from targeted area by non-chemical means and dispose of through alternative disposal .
- .5 Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.
- .6 Pile topsoil by mechanical hoe in berms in locations as directed by Departmental Representative
 - .1 Stockpile height not to exceed 2.5 m.
- .7 Dispose of unused topsoil by alternative disposal off-site.
- .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.

3.2 PREPARATION OF GRADE

- .1 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
 - .1 Grade area only when soil is dry to lessen soil compaction.
 - .2 Grade soil with scrapers establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.3 PLACING OF TOPSOIL

- .1 Place topsoil only after Departmental Representative has accepted subgrade.

- .2 Spread topsoil during dry conditions by mechanical hoe in uniform layers not exceeding 150 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.
- .5 Spread topsoil to following minimum depths after settlement
 - .1 150 mm for seeded areas.

3.4 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.

3.5 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

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 05 16 - Corrected Maximum Dry Density for Fill
- .2 Section 31 05 16 – Aggregates for Earthwork
- .3 Section 31 14 13 – Soil Stripping and Stockpiling

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM D698-07e1 , Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- .2 Underwriters' Laboratories of Canada (ULC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 EXISTING CONDITIONS

- .1 Known underground and surface utility lines and buried objects are as indicated on site plan. Refer to drawings
- .2 Refer to Section 01 71 00 for required underground utilities survey requirements.

Part 2 Products

2.1 MATERIALS

- .1 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

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

3.2 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.
- .2 Strip and stockpile in accordance with Section 31 14 13 – Soil Stripping and Stockpiling.
- .3 Dispose of unused topsoil off site.

3.3 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades as indicated in the appropriate Sections.:
- .3 Slope rough grade away from building as indicated.
- .4 Prior to placing fill over existing ground, scarify surface to depth of 150 mm minimum before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .5 Compact filled and disturbed areas to corrected maximum dry density to ASTM D698, or as follows:
 - .1 Refer to Structural Drawings
 - .2 90 % under landscaped areas.
 - .3 96 % under paved and walk areas.
- .6 Do not disturb soil within branch spread of trees or shrubs to remain.

3.4 TESTING

- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by Departmental Representative . Costs of tests will be paid Departmental Representative in accordance with Sections 01 29 83- Payment Procedures for Testing Laboratory Services and 01 45 00- Quality Control .

3.5 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 .

3.6 PROTECTION

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .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 D422-63[2002] , 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 CSA Group (CSA)
 - .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.

1.3 DEFINITIONS

- .1 Excavation class:
 - .1 Common excavation: excavation of materials of whatever nature, which do not include the removal or rock.
- .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-8.1 and 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00- Quality Control :
 - .1 Submit for review by Departmental Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.
 - .2 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
 - .3 Submit to Departmental Representative written notice when bottom of excavation is reached.
 - .4 Submit to Departmental Representative, testing and inspection 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 existing utilities as found in field.

- .4 Clean and reinstate areas affected by Work as directed by Departmental Representative.

END OF SECTION

- .4 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

1.5 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site. Refer to Section 01 71 00.
 - .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 Departmental Representative establish location and state of use of buried utilities and structures. Departmental Representative to clearly mark such locations to prevent disturbance during Work.
 - .6 Confirm locations of buried utilities by careful soil hydrovac or test excavations.
 - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .8 Where known utility lines or structures exist in area of excavation as indicated on the drawings, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to be paid by Contractor.
 - .9 Where unknown utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to be paid by Departmental Representative.
 - .10 Record location of maintained, re-routed and abandoned underground lines.
 - .11 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, 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 Departmental Representative.
 - .3 Where required for excavation, cut roots or branches only as directed by Departmental Representative.

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 C117] [ASTM C136] . Sieve sizes to [CAN/CGSB-8.2] [CAN/CGSB-8.1] .
 - .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]
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 Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

Part 3 Execution

3.1 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.

3.2 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 Departmental Representative 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.

3.3 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of weeds and grasses are removed from site.
- .2 Strip topsoil to depths to suit new concrete work indicated on Drawings.
 - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Departmental Representative.
 - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil off site as directed by Departmental Representative.

3.4 STOCKPILING

- .1 Stockpile fill materials in areas designated by Departmental Representative.
 - .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.

3.5 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 To be designed by a Professional Engineer.
- .2 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act for the Province of Saskatchewan.
- .3 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .4 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.
- .5 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .6 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.6 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 and in manner not detrimental to property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .5 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.7 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 directed by Departmental Representative.
- .3 Remove asphalt paving and existing precast concrete pavers and other obstructions encountered during excavation in accordance with Section 02 41 13- Selective Site Demolition and as shown on Drawings.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 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.
- .6 For trench excavation, unless otherwise authorized 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.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material off site.
- .10 Do not obstruct flow of surface drainage or natural watercourses.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .12 Notify Departmental Representative when bottom of excavation is reached.
- .13 Obtain Departmental Representative approval of completed excavation.

- .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative .
- .15 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.8 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below.
 - .1 Under concrete slabs: Refer to structural drawings for thickness of compacted thickness base course of Type 1 fill to underside of slab. Compact base course to 100 %. Refer also to Structural Drawings.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services.
- .2 Place bedding and surround material in unfrozen condition.

3.10 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness. Compact each layer before placing succeeding layer.
- .5 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.

3.11 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil and reinstate lawns to elevation which existed before excavation.
- .3 Reinstall pavements and any sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

PART 1 - GENERAL

1.1 References

- .1 All referenced standards to be the current edition or the edition referenced by the applicable Building Code in force at the time of building permit application, as noted on structural drawings.
- .2 Canadian Standards Association (CSA International):
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A23.3, Design of Concrete Structures.
- .3 Canadian Geotechnical Society:
 - .1 Canadian Foundation Engineering Manual.

PART 2 - PRODUCTS

2.1 Materials

- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

PART 3 - EXECUTION

3.1 Site Conditions

- .1 Determine any potential interference with existing services. Locate and mark on site and protect from disruption and damage
- .2 Protect existing structure from damage.

3.2 Foundation Conditions

- .1 A Geotechnical Report has been prepared for an adjacent project by P. Machibroda Engineering Ltd. Report N. S08-6455, May 12, 2008.
- .2 The Geotechnical Report is not represented as a complete description of site conditions but only as to what was found in borings at indicated locations. The Owner, Architect and WSP-S assume no responsibility for any interpretation or deduction that the Contractor may make from the data. The Contractor to establish the nature of observable conditions to his own satisfaction and to obtain additional information, if necessary in his judgment.

3.3 Obstructions

- .1 Obstructions may be encountered during installation of bored concrete piles.
- .2 Have all the equipment required for removal of obstructions readily available for the duration of the bored concrete pile installation.
- .3 The time required to remove obstructions cannot be claimed as additional costs or to extend the overall construction schedule.

3.4 Installation

- .1 Extend bore holes until depth required. Seal and dewater if water is present.

- .2 Break up, remove or drill through all obstructions encountered above approved elevation. Provide concrete or approved fill as necessary to fill all voids created outside the pile shaft due to the removal of obstructions.
- .3 Place concrete in one continuous pour by a method which will prevent segregation of the materials in the mix. Control free-fall. Consolidate concrete by suitable means.
- .4 Where ground water is present, fill temporary construction liner with concrete to at least 1.0 m (3') above the water level outside the liner before starting to withdraw of the liner.
- .5 Set fence post in coordination with fencing trades.
- .6 Remove all excavated materials from site.

END OF SECTION 31 63 23