

1 General

1.1 RELATED SECTIONS

- .1 Read and be governed by conditions of the contract and sections of Division 1.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 117-95, Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-01, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 422-63 (2002), Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 698-00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D 1557-02, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 ASTM D 4318-00, Test Method 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)
 - .1 CSA-A23.1-00, Concrete Materials and Methods of Concrete Construction.
- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1004 (March 1993).
 - .2 OPSS 1010 (March 1993).

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: any solid material in excess of 0.25 m³ and which cannot be removed by means of duty mechanical excavating equipment having a 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: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .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 Unsuitable materials:
 - .1 Weak and compressible materials under excavated areas.
 - .2 Frost susceptible materials under excavated areas.

- .3 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1.
 - .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.

1.4 QUALITY ASSURANCE

- .1 Submit design and supporting data at least 2 weeks prior to commencing Work.
- .2 Design and supporting data submitted to bear stamp and signature of qualified professional Representative registered or licensed in Provinces of Ontario, Canada.
- .3 Keep design and supporting data on site.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Collect and separate plastic, paper packaging and corrugated cardboard.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Ensure emptied containers are sealed and stored safely.

1.6 PROTECTION OF EXISTING FEATURES

- .1 Existing buried utilities and structures:
 - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .2 Prior to commencing excavation work, notify applicable NCC Representative or authorities having jurisdiction, establish location and state of use of buried utilities and structures. ~~Authorities having jurisdiction~~ **Contractor** to clearly mark such locations to prevent disturbance during work.
 - .3 Comply with all requirements of authorities having jurisdiction when working in the vicinity of existing utilities. Temporary support of underground services, where required, are to be in accordance with respective authority having jurisdiction.
 - .4 Confirm locations of buried utilities by careful test excavations.
 - .5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .6 Where unknown utility lines or structures exist in area of excavation, obtain direction of NCC Representative before removing or rerouting.
 - .7 Record location of maintained, re-routed and abandoned underground lines.
- .2 Existing buildings and surface features:
 - .1 Conduct, with NCC 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 to approval of NCC Representative.

1.7 TYPE OF EXCAVATION

- .1 Rock excavation
 - .1 Obtain approval from NCC Representative to use machinery to excavate rock.
 - .2 Notify Representative if actual elevation varies from that assumed.
- .2 Common excavation
 - .1 Assume all excavation on this project is common excavation with the exception of the above rock excavation. All common excavation to be conducted by hand shovel, excavation machinery is not per permitted.

1.8 SHORING, BRACING, AND UNDERPINNING

- .1 Protect existing features in accordance with Health and Safety Requirements and applicable local regulations.
- .2 Engage services of qualified professional Representative who is registered or licensed in province of Ontario to design and inspect shoring, bracing and underpinning required for work.
- .3 Submit design and supporting data at least 2 weeks prior to commencing work.
- .4 Design and supporting data submitted to bear stamp and signature of qualified professional Representative registered or licensed in province of Ontario.
- .5 Professional Representative responsible for design of temporary structures to submit proof of insurance coverage for professional liability except where Representative is employee of contractor, in which case contractor shall submit proof that work by professional Representative is included in contractor's insurance coverage.

1.9 TESTS AND INSPECTIONS

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

2 Products

2.1 MATERIALS

- .1 Type 1 Granular base: granular 'A' to OPSS 1010.
- .2 Type 2 fill: properties to the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

- .3 Imported fill: ~~material obtained from off site sources free of construction debris, with no stones or rubble larger than 100 mm,~~ **Clean sand free of seed and organic material,** approved for use by NCC Representative.

3 Execution

3.1 SITE PREPARATION

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

3.2 STRIPPING OF TOPSOIL

- .1 Strip topsoil to depth of ~~150-200mm~~ **required for the work**. Do not mix topsoil with subsoil.
- .2 Dispose of unused topsoil to location off site.

3.3 STOCKPILING

- ~~.1 Stockpile good quality topsoil as approved by NCC Representative in Rideau Hall compost area or as directed. Stockpile height not to exceed 2 m.~~
- ~~.2 Poor quality topsoil and subsoil shall not be stockpiled.~~
- ~~.3 Stockpile fill materials in areas designated by Representative. Stockpile granular materials in manner to prevent segregation.~~
- ~~.4 Protect fill materials from contamination.~~

3.4 SHORING, BRACING, AND UNDERPINNING

- .1 Construct temporary works to depths, heights and locations as required to execute the work.
- .2 During backfill operation:
.1 Unless otherwise as indicated or as directed by NCC Representative, remove shoring from excavations.
.2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .3 Remove excess materials from site upon completion of substructure construction:

3.5 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while work is in progress.
- .2 Protect open excavations against flooding and damage due to surface run-off.
- .3 Dispose of water in manner not detrimental to public and private property, or any portion of work completed or under construction.

3.6 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.

- .2 All common excavation to be conducted by hand shovel, excavation machinery is not permitted.
- .3 Dispose of surplus and unsuitable excavated material off site.
- .4 Do not obstruct flow of surface drainage or natural watercourses.
- .5 Excavation must not interfere with normal 45° splay of bearing from bottom of any footing.
- .6 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .7 Protect excavations from freezing.
- .8 Keep excavations clean, free of standing water.
- .9 Where soil is subject to significant volume change due to change in moisture content, cover and protect to NCC Representative's approval.
- .10 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify NCC 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 Representative's written authorization to be filled with Granular 'A' compacted as per pipe bedding requirements.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .12 Notify NCC Representative when bottom of excavation is reached.
- .13 Obtain NCC Representative's approval of completed excavation.
- .14 Remove unsuitable material from trench bottom to extent and depth as directed by Representative.
- .15 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with concrete specified for footings.
 - .2 Fill under pavement **and landscape** with Type 2 fill compacted to at least 95% Standard Proctor Density.
 - .3 Fill under other areas with Type 2 fill compacted to not less than 95% of corrected maximum dry density.
- .16 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Representative.

3.7 ROCK EXCAVATION

- .1 Blasting is not permitted.
- .2 Obtain approval from NCC Representative to use machinery to excavate rock.

3.8 FILL TYPES AND COMPACTION

- .1 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from Standard Proctor maximum dry density.
 - .1 Exterior side of perimeter walls: use Type 1 fill to subgrade level. Compact to 95%.
 - .2 Pavement **and landscape** areas: use Type 2 to **rough grade**. ~~underside of base course and Type 1 for base course.~~ Compact to 98%.

3.9 BACKFILLING

- .1 Do not proceed with backfilling operations until **NCC** Representative has inspected and approved installations.
- .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 up to grades indicated. Compact each layer to 95% of maximum proctor dry density before placing succeeding layer.
- .5 Backfill around installations.
 - .1 Place bedding and surround material as specified.
 - .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.
 - .7 Install drainage system in backfill as indicated.

3.10 RESTORATION

- .1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Representative.
- .3 Clean and reinstate areas affected by Work as directed by NCC Representative.

END OF SECTION