

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Section 32 11 16.01 - Granular Sub-Base.
- .3 Section 32 11 23 - Aggregate Base Courses.

1.2 REFERENCES

- .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS.MUNI 1010, April 2013, Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material.
 - .2 OPSS 206 (November 2013) - Construction Specification for Grading.
 - .3 OPSS 501 (November 2014) - Construction Specification for Compacting
- .2 Geotechnical Investigation Proposed Underground Storage Tank Hanger T-58 Ottawa Airport, by Golder, November 2019.

PART 2 – PRODUCTS

2.1 MATERIALS

- .1 Base aggregates: in accordance with Section 32 11 23 - Aggregate Base Courses.
- .2 Subbase aggregates: in accordance with Section 32 11 16.01 - Granular Sub-Base.
- .3 Fill materials: as indicated or to approval of the Departmental Representative.

PART 3 – EXECUTION

3.1 EXCAVATING

- .1 Excavation to be done as per Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 PLACING FILL

- .1 Before taking material from borrow areas, completely use, in fill areas, suitable materials removed from excavation.
- .2 Do not place frozen material nor place material on frozen surfaces. Materials shall be processed to meet the requirements of OPSS.MUNI 1010.
- .3 Maintain crowned surface during construction to ensure run-off of surface water. Do not place material in free standing water. Drain low areas, before placing material.

- .4 Material containing less than 25% by volume of rock fragments larger than 100 mm maximum dimension:
 - .1 Place and compact to full width in uniform layers 200 mm maximum loose thickness.
 - .1 The Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
 - .2 Place using thicker layers only after receipt of written approval from the Departmental Representative.
 - .2 Compact fill materials, in non-pavement areas, in accordance with ASG-06 Appendix H.
 - .3 Compact cohesionless and cohesive fill soils, under pavement areas, in accordance with ASG-06 Appendix H.
- .5 Where material consists principally of rock:
 - .1 Place full width, in layers of sufficient depth to contain maximum sized rocks but in no case is layer thickness to exceed 1 m.
 - .2 Individual rock fragments not exceeding 1.5 m in vertical dimension will be permitted provided their vertical dimension does not exceed one third of fill section depth.
 - .3 Distribute rock material to fill voids with smaller fragments to form compact mass.
 - .4 Fill surface voids at subgrade level with rock spalls or selected material to form an earth-tight surface.
- .6 Do not place stones and boulders exceeding 50 mm maximum dimension within 100 mm of finished surface in graded areas.

3.3 SUBGRADE COMPACTION IN PAVEMENT AREAS

- .1 Fill area: do not place stones and boulders exceeding 150 mm maximum dimension within 0.5 m of subgrade elevation.
- .2 Remove stones and boulders, in cut areas, exceeding 150 mm maximum dimension within specified depth, for subgrade compaction.
- .3 Scarify and mix pavement subgrade surface, after grading has been completed, to required depth of subgrade compaction.
- .4 Compact top 150 mm of cohesive subgrade soils in accordance with ASG-06 Appendix H.
- .5 Compact top 300 mm of cohesionless subgrade soils in accordance with ASG-06 Appendix H.
- .6 Break soil down to sizes suitable for compaction and mix for uniform moisture and soil conditions to full depth of layer.
- .7 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.
- .8 Shape subgrade to required cross section and grade.
- .9 Remove upper portion to depth necessary, when subgrade preparation and compaction cannot be achieved to requirement in single layer, to achieve requirement. Remove, replace and compact such materials at no extra cost to project.

3.4 FINISHING AND TOLERANCES

- .1 Blade finished surfaces in cut and fill areas free from ruts, depressions, rocks in excess of 20 mm and debris.
- .2 Roll finished surfaces to tight dense condition.

- .3 Finish pavement subgrade within 25 mm of design elevations, but not uniformly high or low.
- .4 Finish graded area within 30 mm of design elevations, but not uniformly high or low.
- .5 Surfaces free from depressions exceeding 30 mm in 5 m.

3.5 MAINTENANCE

- .1 Maintain finished surfaces in a condition in accordance with this Section until succeeding material is applied or until acceptance by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 02 41 13 - Selective Site Demolition.
- .2 Section 03 30 00 - Cast-In-Place Concrete.
- .3 Section 31 22 14 - Airfield Grading.
- .4 Section 32 11 23 - Aggregate Base Courses.
- .5 Section 32 11 16.01 - Granular Sub-Base.
- .6 Section 32 12 16 - Asphalt Paving.

1.2 REFERENCES

- .1 Canadian Standards and Recommendations Practices: Airport Engineering.
 - .1 ASG-06 Pavement Construction: Materials and Testing 1996. Returning reusable items including pallets or unused products to vendors.
 - .2 ASG-20 Pavement Construction: Methods and Inspection 1996.
- .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 401, November 2013, Construction Specification for Trenching, Backfilling, and Compacting
 - .2 OPSS.PROV 1001, November 2018, Material Specifications for Aggregates – General.
 - .3 OPSS.MUNI 1010, April 2013, Material Specification For Aggregates – Base, Subbase, Select Subgrade, and Backfill Material.
- .3 American Society for Testing and Materials (ASTM).
 - .1 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .2 ASTM D 422, Standard Test Method for Particle- Size Analysis of Soils.
 - .3 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .4 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .5 Geotechnical Investigation Proposed Underground Storage Tank Hanger T-58 Ottawa Airport, by Golder, November 2019

1.3 DEFINITIONS

- .1 Excavation classes: two class of excavation will be recognized; common excavation and rock excavation.
 - .1 Common excavation: excavation of materials of whatever nature. This includes granular/pulverized material excavation and subgrade soil excavation as per the contract items.
 - .2 Rock excavation: solid material in excess of 1.0 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment. Frozen material not classified as rock.
 - .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
 - .4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
 - .5 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials under excavated areas.

- .2 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-8.2.
 - .2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .6 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 QUALITY ASSURANCE

- .1 The Departmental Representative shall be informed to periodically review pipe bedding no less than 48 hrs prior to installation.

1.5 PROTECTION OF EXISTING FEATURES

- .1 Protect existing features in accordance with Section 02 41 13 - Selective Site Demolition and applicable local regulations.
- .2 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 authorities having jurisdiction, establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
 - .3 Confirm locations of buried utilities by careful test excavations.
 - .4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .5 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing re-routing.
 - .6 Record location of maintained, re-routed and abandoned underground lines.
 - .7 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with the 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 to approval of the Departmental Representative.

PART 2 – PRODUCTS

2.1 MATERIALS

- .1 Pipe bedding and surround should be in accordance with Section 32 11 23 - Aggregate Base Courses and Section 32 11 16.01 - Granular Sub-Base and processed to meet the requirements of OPSS.MUNI 1010, and OPSS.PROV 1001 for Sand.
- .2 Materials should be as indicated on the construction drawing set.
- .3 Trenches: Trenches for storm sewers can be backfilled over the pipes with the existing granular fill found at the site up to the underside of proposed pavement structure, upon approval of the Departmental Representative. Unselected fill and/or construction debris shall not be re-used, as directed by the

Departmental Representative and/or Geotechnical Inspector. Backfill shall be free of any material greater than 100mm in size or angular in nature.

- .4 Backfill for Structures: The excavation surrounding the exterior of the structures such as maintenance holes and catch basins shall be backfilled with Base material conforming to OPSS, to a minimum thickness of 300mm around all sides of the unit.
- .5 Unshrinkable fill: Comply with applicable requirements of Section 31 22 14 - Airfield Grading.
- .6 Concrete bedding: to the requirements of Section 03 30 00 - Cast-In-Place Concrete.

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 02 41 13 - Selective Site Demolition.
- .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 the Departmental Representative approval.
- .4 Protect natural and man-made features required to remain undisturbed.
- .5 Protect buried services that are required to remain undisturbed.

3.3 STOCKPILING REPRESENTATIVE

- .1 Stockpile fill materials in areas designated by the Departmental Representative.
- .2 Stockpile granular materials in manner to prevent segregation.
- .3 Protect fill materials from contamination.

3.4 SHORING, BRACING, AND UNDERPINNING

- .1 Maintain sides and slopes of excavation in safe condition by appropriate methods.
- .2 Construct temporary Work to depths, heights, and locations as indicated or approved by the Departmental Representative.
- .3 During backfill operation:
 - .1 Unless otherwise as indicated or as direction by the 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 an elevation at least 500mm above toe of sheeting.
- .4 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .5 Upon completion of substructure construction:
 - .1 Remove shoring and bracing.
 - .2 Remove excess material from site.

3.5 DEWATERING AND HEAVE PROTECTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Submit for the Departmental Representative's approval details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance local environmental regulations and in manner not detrimental to public and private property, or any portion of Work completed or under construction.

3.6 EXCAVATION

- .1 Do excavating and trenching as necessary to install storm sewers, maintenance holes, catch basins, and all associated appurtenances in accordance with OPSS 401.
- .2 Remove concrete masonry 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 Keep excavated and stockpiled materials a safe distance away from edge of trench.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material in approved location on site or off site.
- .7 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .8 Notify the Departmental Representative when bottom of excavation is reached.
- .9 Obtain the Departmental Representative approval of completed excavation.
- .10 Remove unsuitable material from trench bottom to extent and depth as directed by the Departmental Representative.
- .11 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with fill compacted in accordance with ASG-06 Appendix H.
- .12 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.
- .13 Excavation adjacent to existing runways and taxiways shall be carried out without undermining the existing pavements or other facilities. Protect existing pavements and facilities and repair any damage to the

satisfaction of the Departmental Representative at no cost to the project. Any disturbed areas adjacent to open aprons, taxiways and runways (42.5 m from a taxiway centerline and 47.5 m taxiway centerline and 90.0 m from runway centerline) to be stabilized as directed by the Departmental Representative until areas are restored or completed under the Contract.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Install pipe bedding and surround as indicated on the detail drawings per the pipe trench detail. Granular materials are to be placed in layers not exceeding 300mm, compacted in accordance to OPSS.
- .2 Place bedding and surround material in unfrozen condition.
- .3 Place concrete encasement as indicated under airfield pavement.

3.8 BACKFILLING

- .1 Backfill is to be in accordance with OPSS.
- .2 Do not proceed with backfilling operations until the Departmental Representative has inspected and approved installations.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Backfill around installations.
 - .1 Do not backfill around or over cast-in-place concrete within 24 h after placing of concrete.
 - .2 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 0.5 m.
 - .3 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, compaction pressure and approval obtained from the Departmental Representative or:
 - .2 If approved by the Departmental Representative, erect bracing or shoring to counteract imbalance, and leave in place until removal is approved by the Departmental Representative.
- .6 Place unshrinkable fill in locations as indicated.

3.9 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris and trim slopes, correct defects as directed by the Departmental Representative.
- .2 Replace pavements in accordance with Section 32 11 23 - Aggregate Base Courses, Section 32 11 16.01 - Granular Sub-Base, and Section 32 12 16 - Asphalt Paving.
- .3 Clean and reinstate areas affected by Work as directed by the Departmental Representative.

END OF SECTION