

PART 1 - GENERAL

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| <u>1.1 MEASUREMENT
PROCEDURES</u> | .1 | Work performed under this Section is incidental to work specified in sections requiring excavating, trenching and backfilling. | | |
| <u>1.2 REFERENCES</u> | .1 | ASTM C117-04, Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing. | | |
| | .2 | ASTM C136-06, Test Method for Sieve Analysis of Fine and Coarse Aggregates. | | |
| | .3 | ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) (600 kN-m/m ³). | | |
| | .4 | ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils. | | |
| | .5 | ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils | | |
| <u>1.3 DEFINITIONS</u> | .1 | Common excavation: excavation of materials of whatever nature, other than rock excavation, including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment. | | |
| | .2 | Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding. | | |
| | .3 | Waste material: excavated material unsuitable for use in work or surplus to requirements. | | |
| | .4 | Borrow material: material obtained from other sources outside the site of work, required for construction of fill areas or for other portions of work. | | |
| | .5 | Unsuitable materials: <table> <tr> <td>.1</td> <td>Weak and compressible materials under excavated areas.</td> </tr> </table> | .1 | Weak and compressible materials under excavated areas. |
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1.3 DEFINITIONS (Cont'd)

- .5 Unsuitable materials:(Cont'd)
- .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 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.

1.4 PROTECTION OF EXISTING FEATURES

- .1 Existing buried utilities and structures:
- .1 Size, depth and location of existing underground services and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .2 Prior to commencing excavation work, establish location and state of use of buried services, utilities and structures. Clearly mark such locations to prevent disturbance during work.
- .3 Confirm locations of buried items by careful test excavations.
- .4 Maintain and protect from damage all underground services, utilities and structures encountered.
- .5 Where services and structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .6 Record location of maintained, re-routed and abandoned underground lines.
- .2 Existing surface features:
- .1 Conduct, with Departmental Representative, condition survey of existing pavement, survey bench marks and other surface features which may be affected by work.
- .2 Protect existing surface features from damage while work is in progress. In event of damage, immediately make repair to approval of Departmental Representative.

1.5 QUALITY
CONTROL

- .1 Material source: Submit compliance certificate from material supplier that granular materials meet gradation requirements specified.
- .2 Departmental Representative will employ the services of an independant geotechnical testing agency to conduct compaction testing during backfilling operations.
 - .1 Notify Departmental Representative sufficiently in advance of backfilling operations to arrange for testing personnel to be on site during such work.
 - .2 Coordinate work with Agency's test requirements and procedures.
 - .3 Follow Agency's recommendations to achieve desired degree of compaction.
 - .4 Costs of testing will be paid by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Type 1 and Type 2 fill:
 - .1 Crushed, pit run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation organic material and other deleterious materials.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117.
 - .3 Refer to cast-in place concrete, section 03 30 00.

2.1 MATERIALS .1 (Cont'd)
(Cont'd) .4 Table:
(Cont'd)

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 Sand Bedding: natural sand or crushed stone screenings free from clay lumps, cementation, organic and other objectable material with following gradation limits:

ASTM Sieve	% Passing
4.76 mm	100%
2.00 mm	30 - 100
0.425 mm	10 - 50
0.075 mm	0 - 10

PART 3 - EXECUTION

- 3.1 SITE PREPARATION .1 Remove obstructions, vegetation, debris, ice and snow, from surfaces to be excavated within limits indicated and as required for Work.

- 3.2 STOCKPILING .1 Stockpile excavated and fill materials in areas and to maximum heights as directed by Departmental Representative.
- .2 Protect fill materials from contamination.
- .3 Separate unsuitable material from acceptable excavated material to be reused as backfill.

- 3.3 COFFERDAMS,
SHORING AND BRACING
- .1 Construct temporary works to depths, heights and locations as required and in compliance with applicable health and safety regulations.
 - .2 During backfill operation:
 - .1 Unless indicated or directed otherwise 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 an elevation at least 500 mm above toe of sheeting.

- 3.4 DEWATERING AND
HEAVE PREVENTION
- .1 Keep excavations free of water while work is in progress.
 - .2 Utilize dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs as required to facilitate placement and compaction of backfill materials.
 - .3 Protect open excavations against flooding and damage due to surface run-off.
 - .4 Dispose of water in accordance with Provincial environmental regulations and in manner not detrimental to the environment.
 - .5 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, water courses or drainage areas.

- 3.5 EXCAVATION
- .1 Excavate to lines, grades, elevations and dimensions as indicated.
 - .2 Remove foundation structures, and other obstructions encountered during excavation.
 - .3 Dispose of surplus and unsuitable excavated material off airport site.
 - .4 Do not obstruct flow of surface drainage or natural watercourses.
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| 3.5 EXCAVATION
(Cont'd) | .5 | Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter. |
| | .6 | Notify Departmental Representative when bottom of excavation is reached and obtain Departmental Representative's approval of completed excavation. |
| | .7 | Remove unsuitable material from bottom of excavations to extent and depth as directed by Departmental Representative. |
| | .8 | Correct unauthorized over-excavation as follows:
.1 Fill under bearing surfaces of structures with concrete.
.2 Fill other areas with sand bedding compacted to requirements of clause 3.6.2. |
| | .9 | 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. |
| 3.6 FILL TYPES AND
COMPACTION | .1 | Use fill types as indicated and as specified below. Compaction densities are percentages of Standard Proctor values obtained from ASTM D698 compaction test method.
.1 Around tower concrete foundations: Use Type 2 fill to underside of granular base. Compacted to 98%.
.2 Electrical cable trenches and pullpits: Use Type 2 fill to underside of granular base. Compact to 98%.
.3 Graded fill area around approach towers: Use Type 2 fill to underside of granular base compacted to 98%. Use Type 1 fill for granular base compacted to 98%.
.4 Sand bedding: Compact to 98%. |
| 3.7 SAND BEDDING | .1 | Provide sand as bedding and protective surround for underground electrical cables, cable ducts and pullpits.
.1 Coordinate placement of sand bedding material with electrical cables and other electrical components.
.2 Grade trench bottom to smooth surface, free of stones or soft spots. |

- 3.7 SAND BEDDING
(Cont'd)
- .1 (Cont'd)
 - .3 Place minimum of 150 mm thick sand bed and 100 mm thick sand topping over all utilities and cable runs.
 - .4 Ensure cables and other electrical services are not displaced or damaged during backfilling and compacting operations.
 - .2 Backfill remainder of trench, pullpits and other structures with Type 2 fill.

- 3.8 BACKFILLING
- .1 Do not proceed with backfilling operations until Departmental 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 before placing succeeding layer.
 - .5 Place and fine grade fill material and granular base to grades, profiles and extent indicated.
 - .6 Place concrete for rock area.

- 3.9 RESTORATION
- .1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
 - .2 Reinstate any pavement surfaces, damaged by work, to elevation, and condition which existed before excavation. Compact to 100% density.
 - .3 Reinstate other areas affected by work as directed by Departmental Representative.
 - .4 Wash clean all dirt and debris off runways and other aircraft maneuvering areas affected by work.