

PART 1 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-03, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-01, 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 600 kN-m/m³.
 - .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort 2,700 kN-m/m³.
 - .6 ASTM D4318-00, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian Standards Association (CSA International)
 - .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 CAN/CSA-A23.1/A23.2-00 (August 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

1.2 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: any solid material in excess of 1.00 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 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 Recycled fill material: material, considered inert, obtained from alternate sources and approved by Parks Canada to meet requirements of fill areas. Submit material samples to Departmental Representative for testing and approval.
- .6 Unsuitable materials:

- .1 Weak, chemically unstable, and compressible materials.
- .2 Frost susceptible materials.
- .3 Unshrinkable fill: very weak mixture of Portland 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.
- .2 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 clearance record from utility authority location plan of relocated and abandoned services, as required
- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures
 - .2 Submit 70 kg samples of type of fill specified including representative samples of excavated material.
 - .3 Ship samples prepaid to testing firm selected by the Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.

1.4 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Where a qualified Professional Engineer is an employee of the Contractor, submit proof that Work by the Engineer is included in Contractor's insurance coverage.
- .3 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .4 Design and supporting data submitted to bear stamp and signature of qualified Professional Engineer registered or licensed in Province of Alberta, Canada.
- .5 Keep design and supporting data on site.
- .6 Engage services of qualified Professional Engineer who is registered or licensed in Province of Alberta, Canada in which Work is to be carried out to design and inspect shoring, bracing and underpinning required for Work.
- .7 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Storage and Protection:

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- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures 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 Confirm locations of buried utilities by careful soil hydrovac methods.
 - .3 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
 - .4 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
 - .5 Record location of maintained, re-routed and abandoned underground lines.
 - .6 Confirm locations of recent excavations adjacent to area of excavation.
 - .3 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing buildings, 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.
 - .2 Construction/Demolition Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .3 Place materials defined as hazardous or toxic in designated containers.
 - .4 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.
 - .5 Ensure emptied containers are sealed and stored safely.

1.6 EXISTING CONDITIONS

- .1 Refer to Geotechnical Report in Appendix "B" for site details.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Type 1 and Type 2 fill: properties to the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within the following limits:

Sieve Designation	% Passing		
	Type 1	Type 2	Type 4
75 mm	-	100	
50 mm	-	-	
37.5 mm	-	-	
25 mm	100	-	
19 mm	75-100	-	
12.5 mm	-	-	
9.5 mm	50-100	-	100
4.75 mm	30-70	22-85	90-100
2.00 mm	20-45	-	
0.425 mm	10-25	5-30	
0.180 mm	-	-	20
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 200 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 Type 4 fill: clean sand, or free draining granular fill, free from clay, friable materials, and other deleterious materials.

PART 3 EXECUTION

3.1 SITE PREPARATION

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

3.2 SOIL STRIPPING AND STOCKPILING

- .1 Perform in accordance with Section 31 14 13 – Soil Stripping and Stockpiling.

3.3 SHORING AND BRACING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with the Health and Safety Act for the Province of Alberta.
- .2 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.

- .3 When sheeting is required to remain in place, cut off tops at elevations as indicated by the Departmental Representative.
- .4 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from site and restore watercourses as indicated and as directed by Departmental Representative.

3.4 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Submit for Departmental Representative's review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 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.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved collection 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.

3.5 EXCAVATION

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken. Provide schedule of excavation to Departmental Representative.
- .2 Excavate to lines, grades, elevations and dimensions as indicated.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Dispose of surplus and unsuitable excavated material off site, as directed by the Departmental Representative.
- .5 Do not obstruct flow of surface drainage or natural watercourses.
- .6 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .7 Notify Departmental Representative when bottom of excavation is reached.
- .8 Obtain Departmental Representative approval of completed excavation.
- .9 Correct unauthorized over excavation as follows:

- .1 Fill under bearing surfaces and footings with concrete specified for footings.
- .2 Fill under other areas with Type 2 fill compacted to not less than 98% of corrected Standard Proctor maximum dry density.
- .10 Hand trim, make firm and remove loose material and debris from excavations.
- .11 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
- .12 Open trenches shall not be more than 30 m in length.
 - .1 Open trenches shall be fenced overnight for public and wildlife protection.

3.6 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.
- .2 Exterior side of pre-cast concrete storage tanks: use Type 4 fill within 450 mm from wall and Type 3 fill to sub-grade level. Do not compact soil adjacent to the pre-cast concrete storage tanks.
 - .1 Under exterior concrete slabs and aprons: provide 150mm compacted thickness base course of Type 1 fill topped with 50 mm Type 4 fill to underside of slab. Compact base course to 100%.
 - .2 Under exterior pre-cast concrete storage tank: provide 150mm compacted thickness base course of Type 1 fill.

3.7 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved of construction below finish grade.
 - .2 Inspection, testing, approval, and recording location of underground utilities.
 - .3 Removal of concrete formwork.
 - .4 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 250mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Install drainage system in backfill as indicated.

3.8 TESTING

- .1 The following shall be the minimum acceptable standard for backfill testing:
 - .1 Tests are taken within 24 hours of the backfill being placed in the trench or cut. Reports indicate date when the backfill was placed and testing completed.

- .2 Soil density and moisture content tests are taken on each 150mm of depth for a maximum of 75 meters of trench length or as directed by the Departmental Representative.
- .3 Tests shall be so distributed that they are representative of the entire area of the backfill operations.
- .2 Trenches shall be tested from pipe zone to finished sub-grade.
- .3 Such tests are taken adjacent to the wet well, storage tanks, manholes and valves from pipe zone to finished sub-grade.

3.9 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as directed by Departmental Representative.
- .3 Reinstate lawns to elevation which existed before excavation.
- .4 Rebuild damaged road sections to drawing detail prior to execution of Work. Edges of asphalt on damaged roads are to be saw cut prior to remediation.
- .5 Clean and reinstate areas affected by Work as directed by Departmental Representative.

3.10 TRENCH SETTLEMENT DURING WARRANTY PERIOD

- .1 During the warranty period, the Contractor shall replace material and rectify all failures that occur as a result of settlement of trench backfill or collapse of trench walls.
- .2 Trenches in which backfill settles shall be refilled with the specified backfill material. Paved surfaces that are adjacent to trenches or on trench backfill, which fail during the period, shall be replaced or repaired in an approved manner.
- .3 Replacement or materials and rectification of failures that occur as a result of settlement of trench backfill or collapse of trench walls is entirely the responsibility of the Contractor and such repairs work shall be done at the Contractor's expense.

END OF SECTION