

MCTS CENTRE	EXCAVATING, TRENCHING	Sect 31 23 33.01
PORT AUX BASQUES, NL	AND BACKFILLING	2017-07-13
R.082780.004		Page 1

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 02 41 99 - Demolition.
- .2 Section 31 32 19.01 - Geotextiles.
- .3 Section 33 11 16 - Site Water Utility Distribution Piping.
- .4 Section 33 31 13 - Public Sanitary Utility Sewerage Piping.
- .5 Section 33 34 00 - Sanitary Utility Sewerage Force Mains.
- .6 Section 33 41 00 - Storm Utility Drainage Piping.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .2 ASTM D 422-632002, Standard Test Method for Particle-Size Analysis of Soils.
 - .3 ASTM D 698-00ael, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .4 ASTM D 4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canada Green Building Council (CaGBC)
 - .1 LEED Canada 2009 for Design and Construction-2010, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.

1.2 REFERENCES

(Cont'd)

- .4 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 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .5 Washington State Department of Ecology.
 - .1 Stormwater Management Manual for Western Washington, Volume II, Construction Pollution Prevention (2015 edition).
- .6 Newfoundland and Labrador Department of Municipal Affairs.
 - .1 Municipal Water, Sewer and Roads Master Construction Specifications, latest revision.

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock : 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 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.
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1.3 DEFINITIONS (Cont'd)

- .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 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 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 LEED Submittals:
 - .1 Submit erosion and sedimentation control plan for Credit SSpl in accordance with LEED Canada-NC.

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .3 Quality Control: in accordance with Section 01 45 00 - Quality Control:
 - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
 - .2 Submit for review by Departmental Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.
 - .3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
 - .4 Submit to Departmental Representative written notice when bottom of excavation is reached.
 - .5 Submit to Departmental Representative testing and inspection results and report as described in PART 3 of this Section.
 - .4 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, and location plan of relocated and abandoned services, as required.
 - .5 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.
 - .3 Submit 70 kg samples of type of fill specified including representative samples of excavated material.
 - .4 Ship samples prepaid to Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.
 - .5 At least 4 weeks prior to beginning Work, inform Departmental Representative source of fly ash and submit samples to Departmental Representative.
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MCTS CENTRE	EXCAVATING, TRENCHING	Sect 31 23 33.01
PORT AUX BASQUES, NL	AND BACKFILLING	2017-07-13
R.082780.004		Page 5

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .5 Samples: (Cont'd)
.5 (Cont'd)
.1 Do not change source of Fly Ash
without written approval of Departmental
Representative.

1.5 QUALITY
ASSURANCE

- .1 Submit design and supporting data at least 2
weeks prior to beginning Work.
.2 Design and supporting data submitted to bear
stamp and signature of qualified professional
engineer registered or licensed in the
Province of Newfoundland and Labrador, Canada.
.3 Keep design and supporting data on site.
.4 Engage services of qualified professional
Engineer who is registered or licensed in the
Province of Newfoundland and Labrador, Canada
in which Work is to be carried out to design
and inspect cofferdams, shoring, bracing and
underpinning required for Work.
.5 Do not use soil material until written report
of soil test results are reviewed and approved
by Departmental Representative.
.6 Health and Safety Requirements:
.1 Do construction occupational health and
safety in accordance with Section 01 35 29.06
- Health and Safety Requirements.

1.6 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate waste materials for reuse and
recycling in accordance with Section 01 74 21
- Construction/Demolition Waste Management and
Disposal.
.2 Divert excess aggregate materials from
landfill to local facility for reuse as
directed by Departmental Representative.

1.7 EXISTING
CONDITIONS

- .1 Examine soils report and geotechnical memo located in Appendix G of this specification.
 - .2 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site.
 - .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 authorities having jurisdiction to establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
 - .6 Confirm locations of buried utilities by careful test excavations.
 - .7 Maintain and protect from damage, water, sewer, electric, telephone and other utilities and structures encountered as indicated.
 - .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing and re-routing.
 - .9 Record location of maintained, re-routed and abandoned underground lines.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.
 - .3 Borehole locations are provided in the contract plans for reference only. Borehole logs are included in the Geotechnical Report. PWGSC and the Consultant assume no responsibility for the information included in the Geotechnical Report.
 - .4 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement,
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MCTS CENTRE	EXCAVATING, TRENCHING	Sect 31 23 33.01
PORT AUX BASQUES, NL	AND BACKFILLING	2017-07-13
R.082780.004		Page 7

- 1.7 EXISTING CONDITIONS
(Cont'd)
- .4 (Cont'd)
- .1 (Cont'd)
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 as directed by Departmental Representative.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Type 3 fill: well graded, granular materials such as sand and gravel or well graded rockfill from a quarry source. The maximum allowable particle diameter shall be 100 mm with a maximum fines (minus 0.075 mm) content of 8%. Material will be subject to review and approval by Departmental Representative.
- .2 Granular "A" material in accordance with Class A material of Section 02233 of the Newfoundland and Labrador Municipal Water, Sewer and Roads Master Construction Specifications.
- .3 Granular "B" material in accordance with Class B material of Section 02233 of the Newfoundland and Labrador Municipal Water, Sewer and Roads Master Construction Specifications.
- .4 Unshrinkable fill: proportioned and mixed to provide:
- .1 Maximum compressive strength of 0.4 MPa at 28 days.
- .2 Maximum cement content of 25 kg/m³ with 40% by volume fly ash replacement: to CSA-A3001, Type GU.
- .3 Minimum strength of 0.07MPa at 24 h.
- .4 Concrete aggregates: to CSA-A23.1/A23.2.
- .5 Cement: Type GU.
- .6 Slump: 160 to 200 mm.

2.1 MATERIALS
(Cont'd)
PART 3 - EXECUTION

- .5 Geotextiles: to Section 31 32 19.01 -
Geotextiles.

3.1 TEMPORARY
EROSION AND
SEDIMENTATION
CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 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 99 - Demolition.

3.3 STRIPPING OF BOG.
AND ORGANIC LAYER

- .1 Strip bog and organic layer to depths as indicated and as recommended in geotechnical report included in Appendix A. Avoid mixing bog and organic layer with subsoil.
- .2 Remove and dispose of stripped bog and organic material offsite.

3.4 PREPARATION/
PROTECTION

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

3.4 PREPARATION/ PROTECTION (Cont'd)

- .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.

3.5 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.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and the Health and Safety Act for the Province of Newfoundland and Labrador.
- .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.

- 3.6 COFFERDAMS,
SHORING, BRACING
AND UNDERPINNING
(Cont'd)
- .3 When sheeting is required to remain in place,
cut off tops at elevations as indicated.
 - .4 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.

- 3.7 DEWATERING AND
HEAVE PREVENTION
- .1 Keep excavations free of water while Work is
in progress.
 - .2 Provide for Departmental Representative
review and approval 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 runoff 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.
 - .6 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.

- 3.8 EXCAVATION
- .1 Excavate to lines, grades, elevations and
dimensions as indicated.
 - .2 Remove paving and other obstructions
encountered during excavation in accordance
with Section 02 41 99 - Demolition.
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MCTS CENTRE	EXCAVATING, TRENCHING	Sect 31 23 33.01
PORT AUX BASQUES, NL	AND BACKFILLING	2017-07-13
R.082780.004		Page 11

3.8 EXCAVATION (Cont'd)

- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 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.
- .5 For trench excavation, unless otherwise authorized by 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.
- .6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Dispose of surplus and unsuitable excavated material in approved location on site.
- .9 Do not obstruct flow of surface drainage or natural watercourses.
- .10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .11 Notify Departmental Representative when bottom of excavation is reached.
- .12 Obtain Departmental Representative approval of completed excavation.
- .13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .14 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 3 fill compacted to not less than 95 % of maximum dry density to ASTM D698.

3.8 EXCAVATION
(Cont'd)

- .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.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- .16 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

3.9 FILL TYPES AND
COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698.
 - .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to maximum dry density as follows:
 - .1 85% under landscaped areas.
 - .2 98% under paved and walk areas.
 - .2 Within building area: use Granular "B" to underside of base course for floor slabs. Compact to 100 % of maximum dry density.
 - .3 Under concrete slabs: provide 150 mm compacted thickness base course of Granular "A" fill to underside of slab. Compact base course to 100 % of maximum dry density.
 - .4 Place unshrinkable fill in areas as indicated.

3.10 BEDDING AND
SURROUND OF
UNDERGROUND
SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated and as specified in Section 33 11 16 - Site Water Utility Distribution Piping, Section 33 31 13 - Public Sanitary Utility Sewerage Piping, Section 33 34 00 - Sanitary Utility Sewerage Force Mains and Section 33 41 00 - Storm Utility Drainage Piping.
 - .2 Place bedding and surround material in unfrozen condition.
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- 3.11 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 up to grades indicated. 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. Difference not to exceed 0.6 m.
 - .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 and approval obtained from Departmental Representative or:
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
 - .6 Place unshrinkable fill in areas as directed by Departmental Representative.
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3.11 BACKFILLING .7 Consolidate and level unshrinkable fill with
(Cont'd) internal vibrators.

.8 Install drainage system in backfill as
indicated.

3.12 TESTING .1 Inspection and testing of soil compaction
will be carried out by independent inspection
and testing agency designed by Departmental
Representative. Costs of these tests will be
paid by Contractor in accordance with Section
01 29 83 - Payment Procedures for Testing
Laboratory Services and Section 01 45 00 -
Quality Control.

3.13 RESTORATION .1 Upon completion of Work, remove waste
materials and debris in accordance to Section
01 74 21 - Construction/Demolition Waste
Management and Disposal, trim slopes, and
correct defects as directed by Departmental
Representative.

.2 Reinstall pavements disturbed by excavation
to thickness, structure and elevation which
existed before excavation.

.3 Clean and reinstall areas affected by Work as
directed by Departmental Representative.

.4 Use temporary plating to support traffic
loads over unshrinkable fill for initial 24
hours.

.5 Protect newly graded areas from traffic and
erosion and maintain free of trash or debris.