
Part 1 General

1.1 RELATED REQUIREMENTS

- .1 The list of work sections in this division is indicative and non-exhaustive. It does not exclude the works described in the other specification sections, shown in the drawings or necessary for the execution of the works in keeping with overall intent of the plans.
- .2 Section 31 24 13 – Roadway Embankments.
- .3 Section 31 23 16.26 - Rock Excavation.

1.2 Scope of work

- .1 Supply all labour, expertise, equipments and materials for the manufacturing, transportation and complete erection of the wooden structure with complete integrity/in harmony with the other construction elements.
- .2 The current section of specification must be read with the geotechnical report 4956-00-01 at the same time.

1.3 Related included work

- .1 The following list of work presented in this section of specification is indicative, non-exhaustive and includes :
 - .1 Excavation and backfill for all civil related and outdoor landscaping work.
 - .2 Excavation and backfill for the construction of the building, expansions and the bridge.
 - .3 Waterproofing work on expandable soil.

1.4 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C117-04, Standard Test Method for Material Finer than 0,075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63 2002, 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 (12,400 ft-lbf/ft) (600 kN-m/m).
 - .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft) (2,700 kN-m/m).
 - .6 ASTM D4318-05, Standard Test Methods 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 International)
 - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CAN/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.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities : Developing Pollution Prevention Plans and Best Management Practices.

1.5 DEFINITIONS

- .1 Excavation classes : Two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock excavation: Solid material in excess of 1.00 m³ that cannot be removed by means of heavy duty mechanical excavating equipment with a 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
 - .2 Common excavation: Excavation material of any nature that is not included in definition of rock excavation.
- .2 Unclassified excavation: Excavation of deposits of any nature 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 materials larger than 25 millimeters.
- .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 and obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 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.

1.6 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Verify and validate location of underground utilities. Produce location plan of existing utilities as found in field, including clearance record from utility authority and location plan of relocated and abandoned services, as required.
- .3 Samples :
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 At least three weeks prior to beginning backfill Work, inform Departmental Representative of proposed source of fill materials and provide access for sampling.
 - .3 Submit drawings and technical details for the bituminous membrane to be installed on the rock surface.

1.7 HEALTH AND SAFETY

- .1 Comply with construction occupational health and safety regulations in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.8 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, authorized site. Obtain necessary permits and authorizations necessary beforehand, and notify Departmental Representative.

1.9 EXISTING CONDITIONS

- .1 See Appendix in the specifications for soil report.
- .2 Buried services :
 - .1 Before beginning Work, verify location of buried services on and adjacent to site.
 - .2 Arrange with authority having jurisdiction for relocation of buried services that interfere with execution of work; pay costs of relocating services.
 - .3 Remove and dispose of obsolete buried services and cap cut-offs.
 - .4 Size, depth and location of existing utilities and structures as indicated are for informational purposes only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, establish location and condition of buried utilities and structures, and notify Departmental Representative of findings. Provide and apply measures necessary to prevent interruption of service during Work.
 - .6 Confirm locations of buried utilities through careful test excavations.

- .7 Maintain and protect identified water, sewer, gas, electric, telephone and other utilities and structures from damage, as indicated.
 - .8 Where utility lines or structures exist in area of excavation, obtain appropriate instructions from Departmental Representative before performing work.
 - .9 Record location of maintained, re-routed and abandoned underground lines, and submit this information to Departmental Representative.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing surface features :
- .1 Conduct, with Departmental Representative, condition survey of trees and other plants, lawns, fencing, service poles, wires, pavement, boundary markers and bench marks that could be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, repair immediately as directed by Departmental Representative.
 - .3 Where required for excavation, cut roots or branches as directed by Departmental Representative.
- .4 Findings during excavation :
- .1 During excavation, if any archaeological objects or items of significance are found, then the excavation must be halted. The Contractor must inform the Departmental Representative without delay so proper inspections can be performed. The Contractor can resume digging or backfilling only after he receives a written notification and instructions by the Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Type 1 and Type 2 fill: Properties to Section 31 05 16 - Aggregate Materials.
- .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 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 In addition to the geotechnical requirements, backfill or borrow materials coming from outside the work limits and used inside the work limits must respect the level "A" MDDELCC criteria as per the « Politique de protection des sols et de réhabilitation des terrains contaminés ».
- .4 Geotextiles: Section 31 32 19.01 - Geotextiles.
- .5 Bituminous membrane on the rock surface.

Part 3 Execution

3.1 PREPARATIONS

- .1 Remove obstructions, ice and snow from surfaces to be excavated within excavation area.
- .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 Inside the building zones, remove the asphalt layer and/or the concrete slab before excavating.
- .4 Near buildings, the Contractor must take all precautions before starting the excavation so as to prevent any damage to the integrity of the existing foundation.

3.2 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .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's approval.
- .4 Protect natural and man-made features that are 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 to remain undisturbed.
- .6 For excavation works inside the building, use equipments adapted to the situation to prevent any damage to the building and that produces none or little and safe vibration levels.
- .7 Take all required precautions before starting excavations that could affect the stability of the existing foundations.

3.3 STRIPPING OF TOPSOIL

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

3.4 STOCKPILING

- .1 Granular material in accordance with Section 31 05 16 - Aggregate Materials.

3.5 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.

- .2 Provide, for Departmental Representative's review, details of proposed dewatering or heave prevention methods.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent bottom heave of excavations or piping heave 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.

3.6 EXCAVATING

- .1 Advise Departmental Representative at least seven days in advance of excavation operations so that initial cross sections can be taken.
- .2 Before beginning excavation work, become familiar with the geotechnical report that describes the nature of the soil on site, more specifically rock dip and angle of inclination, in order to prevent ground from becoming unstable. Provide a supporting system for trenches if needed. Limit depth of excavation to that required to perform Work.
- .3 Before beginning excavation Work, Contractor to present Departmental Representative with excavation drawings that have been stamped and signed by a geotechnical engineer who is a member of the Ordre des ingénieurs du Québec.
- .4 Excavate to lines, grades, elevations and dimensions as indicated by Departmental Representative.
- .5 During excavation, remove structures in accordance with Section 02 41 13 - Selective Site Demolition.
- .6 Excavation must not interfere with bearing capacity of adjacent foundations.
- .7 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.
- .8 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 more than 15 m open at end of work day.
- .9 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

- .10 Restrict vehicle operations directly adjacent to open trenches.
- .11 Dispose of surplus and unsuitable excavated material in approved location.
- .12 Do not obstruct flow of surface drainage or natural watercourses.
- .13 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .14 Notify Departmental Representative when bottom of excavation is reached.
- .15 Obtain Departmental Representative approval of completed excavation.
- .16 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .17 Correct unauthorized over-excavation as follows.
 - .1 Fill with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.
- .18 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 Departmental Representative's approval.
- .19 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.
- .20 Install bituminous membrane on the rock surface while respecting the requirements of oxygen exposition of this membrane which is usually 12 hours or more.
- .21 Once the bituminous membrane has been installed, take all precautions to protect it and prevent any damage.
- .22 Before backfilling the excavation area where a bituminous membrane has been installed, the Departmental Representative must first inspect it and authorize it.

3.7 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 and ASTM D1557.
 - .1 Place unshrinkable fill in areas as indicated.

3.8 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 Sections 33 11 16 – Site water utility and 33 41 00 – Sewer pipe.
- .2 Place bedding and surround material in unfrozen condition.

3.9 TRANSITIONS

- .1 Perform transitions between backfill soils and undisturbed soils wherever backfill is realized underneath a road surface (parking, driveway, etc.), a pavement or a shoulder of the road. In every case, use the most restrictive permitted slopes, either by the CSST or the transitions slope presented in this article.
- .2 Use 1H :1V transition slope starting from the infrastructure line down to a depth of 2.15 m when backfill materials and the undisturbed soil are of the same properties and qualities (frost susceptibility, mechanical properties, etc.) such as for materials coming from the excavation for example.
- .3 When backfill materials and the undisturbed soil are of different properties and qualities (frost susceptibility, mechanical properties, etc.) use the following slope depending upon the position of the excavation versus the axis of the roadway. Furthermore, when reusing materials coming from the same excavation in a place where the soil is undisturbed of which two or more layers of materials are of different properties and qualities, use the following slope if the materials are not replaced in the right order and original position.
 - .1 When the excavation walls are parallel to the roadway, use slopes of 3H : 1V transition slope starting from the infrastructure line down to a depth of 2.15 m
 - .2 When the excavation walls are perpendicular to the roadway, use slopes of 3H : 1V transition slope starting from the infrastructure line down to a depth of 2.15 m.
 - .3 When backfilling around a fixed infrastructure such as a manhole, catch-basin, retention basin, valve chambers, etc., use slopes of 3H : 1V transition slope starting from the infrastructure line down to a depth of 2.15 m.

4 CRUSHED STONE BEDDING

- .1 To ensure a stable bedding when in-situ conditions are unstable (presence of water, etc.), use a bedding with clean 20 mm crushed stone and geotextile membrane :
 - .1 If rock is present underneath the bedding, simply cover the surface bedding with a geotextile membrane.
 - .2 If the material underneath the bedding is not solid rock, then wrap the crushed stone bedding with a geotextile membrane.
 - .3 Spread out, level, and compact the crushed stone with mechanical means to avoid any settling of material.

3.10 BACKFILL

- .1 Do not proceed with backfilling operations until :
 - .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 shoring and bracing; backfilling of voids with satisfactory soil material.
 - .5 Inspection of the bituminous membrane by the Departmental Representative.
- .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 Backfilling around structures :
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Place layers simultaneously on both sides of installed Work to equalize loading.
- .5 Backfill to infrastructure line in accordance with CCDG – Latest edition and BNQ 1809-300 /2004 – Latest edition or sections shown on the plans.

3.11 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as indicated or as directed by Departmental Representative.
- .3 Restore lawns to elevation that existed before excavation.
- .4 Clean and restore areas affected by Work as directed by Departmental Representative.
- .5 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION