

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 02 41 99 – Demolition for minor works

1.2 REFERENCES

- .1 For the excavation, trenching, bedding and coating and backfilling for pipes, catch basin, manholes, inspection chambers, valves chambers and other components of drinking water and sewer network, refer to the requirements of the standard specification NQ 1809-300 "construction, General clauses techniques, water mains and sewer" 2007 version.
- .2 For the excavation of, trenches, cushions, foundations, granular backfill and the foundation for all other work and for transport and storing of aggregates, refer to the requirements of Specification and general specifications of the Ministry of Transport of Quebec (GDAL), version 2011.
- .3 For the classification, description and physical characteristics of aggregates, refer to the NQ 2560-114 standard "Work in Civil Engineering - Aggregates," 2002 version.
- .4 Refer to the requirements of "Safety Code for Construction" (S 2.1, r. 6).
- .5 Refer to the requirements of the "Law on Environmental Quality" (RSQ, chapter Q-2).
- .6 For information only, refer to the guide "To better perform, digging, excavation, and trenching - Checklist for employers," 2001 version, published by the Commission on Health and Safety (CSST).

1.3 MEASUREMENT PROCEDURES

- .1 Site preparation shall be measured in square meters of surface actually modeled regardless of depth removed or number of operations required. The article "Enlèvement et disposition hors site" shall include all necessary operations to shape the works receiving surface including removal of excess material, removal of existing bollards and disposal to an authorized site.
- .2 Excavation of soft spots shall be measured in cubic meters of removed material. The item shall include removal and disposal to an authorized site of improper material as judge by the ministry representative, supply, installing and compacting de MG-20 stone to fill the excavation and all machinery, equipment, material and labor required to complete the works.

1.4 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; first class and second class excavation
 - .1 Cuttings first class: first class cuttings are cuttings of solid rock, as defined in Article 11.4.3 of CCDG, version 2011.
 - .2 Second class cutting: the debris of natural materials (soil, rocks, friable), other than first class and aggregate made from natural materials (sand, gravel, crushed stone) are called second class.
 - .3 The removal of the asphalt and the sidewalks and curbs is not considered as cut and are subject to Section 02 41 99 "Demolition minor works."

- .2 Topsoil: any material suitable for promoting plant growth and can be used as land fill, for landscaping or for seeding.
- .3 Waste materials: materials surplus or unsuitable excavated material for the purpose of this work.
- .4 Borrowed Materials: materials outside of leveling area, and necessary for the construction of embankments or other parts of the book.
- .5 Unsuitable materials:
 - .1 Compressible and weak materials beneath the excavated areas
 - .2 Frost-susceptible materials beneath the excavated areas
 - .3 Any expansive material
- .6 Backfill with no withdrawal: a mixture composed of very few resistant Portland cement, aggregates, concrete and water, which will not settle once in place in the trenches for receiving utility lines, and that the can be excavated without prior preparation.
- .7 Freezable grounds: all the soil on the site is considered to be frost susceptible. For the purposes of this section, the soil frost susceptible.
- .8 Contaminated stones by fine soil:
 - .1 Crushed stone of granular base no longer meeting the requirements of Article 2.1 "Materials" of this document since it was contaminated with fine soils during construction.
- .9 Backfill soil: backfill meeting the requirements of Article 11.6.1.2 of CCDG and recommendations of the laboratory, under the "Law on Environmental Quality."
- .10 Stone backfill: Backfill meeting the requirements of Article 11.6.1.4 of CCDG and recommendations of the laboratory, under the "Law on Environmental Quality."
- .11 PPV: peak particle velocity, as measured by a seismograph in any of the three components of the wave vibrations (transverse, longitudinal or vertical).

1.5 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures
- .2 Four(4) weeks prior to beginning of works. Advise engineer of the filling material supplies, and assure access of it for sampling.
- .3 Provide 70 kg samples of each type of filling material, and the same amount of excavation material.

1.6 PROTECTION OF EXISTING STRUCTURES

- .1 Underground structures and utility lines
 - .1 Provided details of the size, location and depth which are buried structures and utility lines marked, are only indicative and are not necessarily accurate or complete.
 - .2 Before you begin digging any trenches, notify the authorities of the utilities involved and determine the location and condition of structures and underground networks. Clearly identify the locations to avoid any service interruption during the execution of the work.

- .3 Confirm the location of underground networks by making careful excavation test
- .4 Maintain and protect against all possible damage: water, sewer, gas, electricity and telephone pipes and other works that may be present. Before moving or disturbing in any way a book or a public service network, get the proper guidelines of the service.
 - .1 If required, ask the utility company to remove or divert the existing networks in the area of excavation. Assure payment for this
 - .1 Note the location of underground pipes stored, diverted or abandoned.
- .2 Buildings and existing elements on the surface.
 - .1 In the presence of the Engineer, check the condition of buildings, trees and other plants, lawns, fences, utility poles, cables, rails, railway, roads, terminals, markers and monuments that can be damaged during the work.
 - .2 During the execution of the work, protect against damage buildings and other existing surface that might be damaged. If necessary, make the necessary repairs.

1.7 VIBRATIONS CONTROL

- .1 Reduce vibration on the ground to avoid damaging work or massive rock to preserve.
- .2 Close to the work or the structures the max particle speed must not exceed 25 mm/s.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Standard Aggregates: aggregate designated by the prefixes' MG-'," CG-'," BC-"or" AB-"meeting the requirements of the standard NQ 2560-114/2002;
- .2 Aggregate standard include but are not limited to, the following materials: "MG20, MG-112, MG-56, CG-14 BC5-20"
- .3 Backfill with no withdrawal: backfill meeting the requirements of Article 6.6 of the standard NQ 1809-300/2004.
- .4 Sand Class, "A" graded sand can be compacted with 100% passing 5 mm sieve and less than 8% passing the sieve 80 µm, with the following characteristics:

Criteria	Limits	Standards
Micro-Deval (MD)	< 35%	LC 21-101
Friability	< 40%	LC 21-080
Organic content	< 0,8%	LC 31-228
Blue Value	< 0-20%	LC 21-255
Content of clay lumps	< 1%	CSA-A23-2-3A

- .5 The Contractor shall ensure that the MG-112 materials Class "A" are not from sand contaminated by the bacteria of iron.
- .6 Stone dust: crushed stone can be compacted, as the zone size:

Diameter	Passing %
10 mm	100%
5 mm	90 - 100 %
80 mm	2 - 10 %

PART 3 EXECUTION

3.1 SITE PREPARATION

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

3.2 TOPSOIL

- .1 Remove topsoil to a depth determined by the laboratory (see soil survey).
- .2 Do not mix topsoil with soil from the basement.
- .3 Put topsoil in stockpiles at the locations indicated by the Engineer. The height of the pile should not exceed 2 m and be protected against erosion piles.
- .4 Evacuate unused topsoil from the site.

3.3 STOCKPILING

- .1 Stockpile fills materials in areas designated by Engineer. Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
 - .1 Evacuate all exceeding material out of the site; execute appropriate work to restore the initial water flow according to the engineering directive.

3.4 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Submit to the Engineer, if requested, shop drawings devices shoring and bracing required for excavations. The drawings must clearly indicate the method and sequence to follow.
- .2 Support and braced excavations, to avoid slipping according to the Safety Code for the construction of Quebec and the regulations of local authorities.
- .3 Repair any damage and pay for it; also assume responsibility for any accident caused by the work of shoring and bracing.
- .4 Retain the services of a competent professional engineer recognized in the province of Quebec, for the design and inspection of books and shoring bracing.

- .5 As part of its bid, the contractor must evaluate the size and precise location of retaining walls, temporary excavations according to the conditions of soil and rock indicated in geotechnical investigation report of the project and that depending on the methodology of works he intends to use to include coordination with all disciplines of the project.
- .6 During backfill operation:
 - .1 Unless otherwise indicated or directed by engineer, 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.
- .7 When sheet piling, piles or any other temporary retaining may remain in place without harming the infrastructure and building construction provided, screed these elements at a depth of 2.0 meters above the finished grade . In case of conflict with facilities and buildings scheduled in the Contract, screed these elements to the level required for the completion of the work.
- .8 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 the Engineer.

3.5 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for review to a engineer details of proposed dewatering of excavation. .
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water and in manner not detrimental to public and private property, or portion of Work completed or under construction.
- .5 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.

3.6 EXCAVATION

- .1 Make the cuttings according to the routes, levels and dimensions suitable for installation, construction and inspection of the book prescribed.
- .2 During the excavation, removal of concrete structures, masonry, road surfaces, sidewalks, foundations demolished and the stones and any other obstruction according to section 02 41 99 "Demolition for minor works."
- .3 Do not disturb the cone of normal transfer charges at 45 ° under the soles.

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- .4 Unless the Engineer authorize it by a handed writing document, no digging more than 30 m of trench prior to installation of items to be buried, at the end of a workday, the length left open trench shall not exceed 15 m.
- .5 Transport unsuitable cuttings or surplus from the site.
- .6 Do not obstruct the flow of surface water or natural water courses.
- .7 The bottoms of the exploration excavations should follow the slope shown on the plan or, where appropriate, is level, and consists of undisturbed land free of loose materials, soft or organic.
- .8 The tolerance of the trenches bottoms is 20 mm above or below the level and profile required, the difference may not be uniform and more or less.
- .9 The bottom of the excavation must be level and consists of undisturbed land free of loose materials, soft or organic.
- .10 Inform the Engineer if the earth at the bottom of excavations seems inappropriate and proceed as directed by the Engineer.
- .11 Once the excavations are completed, have them approved by the Engineer.
- .12 Remove any unsuitable material on the bottom of the trenches, on the length and depth determined by the Engineer.
- .13 The Contractor shall protect the bottoms of rock excavation under footings, raft foundation and the entire inner area of the building corresponding to the foundation slab on grade. Any rock bottom can't be exposed to air for a period of more than 24 hours before being protected in accordance with the following information:
 - .1 Flat bottom excavation of detail and final mass excavation under slabs on grade and footings: protection with a layer of 100 mm of lean concrete.
 - .2 Sloping bottom of excavation: protection by means of a bituminous membrane.
 - .3 Inclined bottom and flat rock cuttings: protection by means of a bituminous membrane.
 - .4 In the event of conflict with the cuts and details appearing in the plans, consider that this section prevails.
- .14 When we dug too deep without authorization:
 - .1 In the trenches, for the sewer and potable water network, fill the excavations with an excess aggregate MG-112 on a standard NQ 2560-114/2002 and compacted to a minimum of 95% maximum density according to the modified Proctor test ASTM D1557.
 - .2 For the foundation of the building, pouring concrete filling under bearing surfaces and soles (as section 03 30 01)
- .15 Complete excavation by hand, strengthen the walls and remove all non-adherent materials and debris on it. When materials from the bottom of excavations have been stirred, compact the bottom of the excavation at a density at least equal to that of undisturbed soil.
- .16 Install geotextile in accordance with Section 31 32 21 - Geotextiles.

3.7 PROFILE AND LEVEL EXCAVATION

- .1 The excavation profile levels shown on drawings are judge as minimal conditions.
- .2 The Contractor shall consider in its proposal any additional amount to be included in the bid price by basing its decision on data available in the geotechnical investigation report of the project.
- .3 Foundations level adjustments should be realise considering the neighbours footing interactions and should be approve by an engineer.

3.8 TRANSITIONS

- .1 The transition and the excavation slope between the different depths should be of 1:1.

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 D698.
 - .1 Exterior side of perimeter walls: use Type 3(natural compactable soil or class A fill material) and fill to sub grade level. Compact to 90% of correct maximum dry density(unless otherwise specified).
 - .2 Within building area: use Type 2 fill MG-112, to underside of base course for floor slabs. Compact to 95 % of correct maximum dry density.
 - .3 Under concrete slabs: provide 250 mm compacted thickness base course of Type 1fill MG-20 to underside of slab. Compact base course to 95%.
 - .4 Retaining walls: use Type 2 fill MG-112 or class 'A' fill to subgrade level on high side for minimum 1000 mm from wall and compact to 95 %
 - .5 Draining material under the ground slab
 - .1 A drainage layer of stone <BC-5-20> as described in CCDG Department of Transportation of Quebec, with the minimum thickness shown in the drawings.
 - .2 The Contractor shall set up and compact the stone by making a minimum of 3 passes of roller compactor 2 tons (unless otherwise noted)

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 sections 33 05 14 - Manholes and Catch Basin Structures, 33 46 16 - Subgrade Drainage Network.

3.11 BACKFILLING

- .1 Do not proceed with backfilling operations until job as been inspected and approved by an engineer.
- .2 Areas to be backfilled are 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 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 For the storm sewer trenches, backfilling is done according to the requirements of the standard specification NQ 1809-300 "Construction Clauses general technical, water mains and sewer" 2004 version.
- .6 Set up the layers of backfill simultaneously on both sides of the works installed in order to balance the load. The difference between the heights of filling must not exceed 0.6 m.
- .7 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 ministry Representative or engineer
 - .2 If the engineer approves it, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by ministry Representative.
- .8 Install a drainage system filter in backfill according indications or ministry Representative.

3.12 TEST AND INSPECTIONS

- .1 The ground compaction test will be executed by the laboratory designated by the owner. The frequency of these test will be determined by the ministry Representative.

3.13 RESTORATION WORK

- .1 At completion, remove surplus materials and debris, adjust the slopes and correct the defects identified by the Engineer.
- .2 Clean and rehabilitate areas damaged during the work, as directed by the Engineer.
- .3 Replace the road surfaces and sidewalks affected by the work in the state and at the level they were prior to the latter, taking care to respect the original thickness of these structures.
- .4 Protect newly graded areas against erosion, to prevent the movement and keep them free from waste or scrap.

END OF SECTION