A. ENGINEERING SPECIFICATIONS

.1 General Instructions – Section 01005

(Provided separately by NCC, refer to tender documents)

.2 Description of Items in the Tender Form

.3 "Appendix 2 – Explication Notes on the Boring Log, Boring Logs" as part of the Slope Stability Study, prepared by LVM (February 2012)

.4 Environmental Measures

.5 Temporary Installations – Section 01500

(Provided separately by NCC, refer to tender documents)

.6 Health and Safety – Section 01705

B. ENGINEERING DRAWINGS

C-00 Cover Sheet

C-01 Legal and Topographical Survey Plan

C-02 General Notes

C-03 Slope Stability Plan

C-04 Cross-Sections and Details

C-05 Cross-Sections and Details

C-06 Cross-Sections and Details

C. OTHER TENDER DOCUMENTS (THAT THE BIDDERS MUST PURCHASE AT THEIR OWN COST)

1. Devis normalisé – BNQ 1809-300/2004 (R2007) : Travaux de construction – Clauses techniques générales – Conduites d'eau potable et d'égout

2. Cahier des charges et devis généraux (CCDG) – Infrastructures routières – Construction et réparation, édition 2009 (produit et publié par le ministère des Transports du Québec)

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I. GENERAL GUIDELINES

This section describes the materials the Contractor will be able to use for this project, as well as the required method of execution. Notwithstanding the following, the Contractor must conform to the standardized specification BNQ 1809-300/2004 (R2007), published by the *Bureau de normalisation du Québec,* to the *Cahier des charges et devis généraux (CCDG)*, 2011 edition, published by the *Ministère des Transports du Québec (MTQ)* and to the norms and regulations in effect.

THE LUMP SUM AMOUNT OR UNIT PRICE FOR EACH ITEM IN THE TENDER FORM MUST INCLUDE ALL COSTS FOR LABOUR, MATERIALS AND EQUIPMENT, AS WELL AS, MOBILIZATION/DEMOBILIZATION COSTS, NECESSARY FOR THE COMPLETE EXECUTION OF THE WORK, AS SPECIFIED IN THE SPECIFICATIONS AND ON THE DRAWINGS.

II. DESCRIPTION OF MATERIALS

1.1.1 Rip-rap	
Rip-Rap (for slope stability)	Type 5 rip-rap (500-300 calibre), approved by a geotechnical engineer: -At least 60% particles greater than 300 mm; -Must have sharp edges; -Relative density greater than 2.6; -Must not contain frost-riven, weak or friable material; -Must not be contaminated. (Refer to Item 5. under Section III “Execution of Work”)
Rip-Rap (for pipe extremities)	Type 2 rip-rap (200-100 calibre), approved by a geotechnical engineer. (Refer to Item 5. under Section III “Execution of Work”)
1.1.2 Geotextile	
Geotextile	Nonwoven geotextile fabric, Type V, in compliance with standard 13101 « Geotextiles » from Tome VII of provincial standards “*Ouvrages routiers”* from the *Ministère des Transports du Québec*.

1.1.3 Culvert	
Culvert	Reinforced Concrete Pipe (Cl. IV) or smooth interior HDPE pipe (320 kPa), as per BNQ.
1.1.4 Bedding and Cover	
Bedding	MG-20 crushed granular, as per standard NQ 2560-114, compacted to 95% of the "Modified Proctor".
Bedding (non compacted)	MG-20 crushed granular, as per standard NQ 2560-114, not compacted.
Pipe cover	CG-14 crushed granular, as per standard NQ 2560-114, compacted to 95% of the "Modified Proctor" in layers having a maximum of 200 mm in thickness.
Protective cushion	CG-14 crushed granular, as per standard NQ 2560-114, not compacted.
1.1.5 Backfill Over Culvert	
Backfill Over Culvert	MG-112 crushed granular, as per standard NQ 2560-114, compacted to 90% of the "Modified Proctor" in layers having a maximum of 150 mm in thickness.
1.1.6 Granular Foundation	
Granular Base	MG-20 crushed granular, as per standard NQ 2560-114 compacted to 95% of the "Modified Proctor".
1.1.7 Hydroseeding	
Hydroseeding	Type 3 Hydroseeding on 100 mm of topsoil.
1.1.8 Topsoil	
Topsoil	Friable soil composed of 45% sand, 30% silt, 20% clay, 5% organic matter and a pH value between 6 and 7, free of sub-soil, roots, vegetation, contaminated materials and rocks larger than 10 mm in diameter.

III. EXECUTION OF WORK

1. SITE PREPARATION

1.1 Removals

1.1.1 Removal of Wooden Square Post Fence (150m x 150m x 450m)

The Contractor must remove a portion of the existing wooden square post fence to allow for construction of the temporary access road. Following completion of work, the Contractor must construct a new wooden square post fence to match existing conditions. This item will be paid as a lump sum.

1.1.2 Removal of Snow Fence

The Contractor must remove the existing orange “snow fence” (60 m), including disposal off-site. This item will be paid per linear meter of fence.

1.2 Relocation, Trimming, Protection and Clearing of Trees

The Contractor must relocate, trim, protect and/or clear existing trees as required to allow for construction of the temporary access road, for slope stability work and to make work complete., The Contractor, in presence of an NCC representative, must identify on-site all trees affected by the proposed and temporary work. The Contractor must prepare and submit a Tree Management Plan for approval to the Engineer and the NCC. The NCC must approve all tree relocation, trimming, protection measures and clearing before construction start. This item will be paid as a lump sum.

The Contractor must refer to section “ENVIRONMENTAL MEASURES” in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

1.3 Temporary Works

1.3.1 Construction Fencing and Construction Signage

The Contractor must supply and install temporary construction signs and temporary metallic construction fencing (such as MODU-LOC, or approved equivalent) at the perimeter of the site. Construction fencing must be at least 1.8 meters in height. Signs and fence must be removed by the Contractor following completion of work. This item will be paid as a lump sum.

The Contractor must provide for approval to the Engineer, at least 72 hours in advance, an MTQ type signposting plan clearly demonstrating truck access to the site, fence location and sign location (as required). Work cannot start until approval is issued by the Engineer to the Contractor.

1.3.2 Temporary Drainage Directed Away from Landslide Area

The Contractor must provide temporary drainage measures during the construction period to intercept the storm water runoff upstream from the landslide area. Measures must be approved by the Engineer. Following completion of work, temporary drainage measures must be removed and work area reinstated to existing conditions. This item will be paid as a lump sum.

The Contractor must refer to section "ENVIRONMENTAL MEASURES" in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

1.3.3 Construction of Temporary Access Road

The Contractor must construct a temporary access road, including, but not limited to, excavation, geotextile, granular material, compaction, protection of excavation side slopes and sediment and erosion control. Following completion of work, temporary access road must be removed and work area reinstated to existing conditions. This item will be paid as a lump sum.

The Contractor must refer to section "ENVIRONMENTAL MEASURES" in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

1.3.4 Construction Fencing Allowance

The Contractor must carry a cash allowance for the supply and installation of additional construction fencing as indicated by the Engineer and/or the NCC. Refer to item 1.3.1.

2. DITCHING AND CULVERTS

2.1 Ditch – North Side of Eardley Road

The Contractor must construct all ditches, as shown on drawings, including, but not limited to, excavation, stocking of re-usable materials on-site, disposal of unsuitable and surplus materials off-site and reinstatement of disturbed areas to existing conditions. This item will be paid per linear meter of ditch.

2.2 Rip-Rap - Type 2

The Contractor must supply and install the proposed rip-rap Type 2, as specified on drawings, including geotextile. The minimum thickness of rip-rap must be as specified on drawings. This item will be paid per square meter (plan view).

The Contractor must refer to section “ENVIRONMENTAL MEASURES” in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

2.3 Manhole-Catchbasin

The Contractor must supply and install the proposed manhole-catchbasin, as specified on drawings. The work includes, without limitations, excavation, stocking of re-usable materials on-site, disposal of unsuitable and surplus material off-site, trench dewatering, preparation of foundation, bedding, new manhole, frame (ductile iron model AJ-775 by Mueller or approved equivalent), grate (ductile iron model CB526 by Mueller or approved equivalent), frame guide (ductile iron model AJ-775-GD by Mueller or approved equivalent) and excavation backfill. This item will be paid per unit.

2.4 Culvert – 600 mm diam.

The Contractor must supply and install the proposed culvert, as specified on drawings. The work includes, without limitations, excavation, stocking of re-usable materials on-site, disposal of unsuitable and surplus material off-site, trench dewatering, preparation of foundation, pipe bedding, new culvert, pipe cover, transportation, assembly (if any), welding (if any), excavation backfill up to the infrastructure elevation, as well as, the required fill material for when the infrastructure elevation is found above the existing ground level before excavation and the reconstruction of the existing access road to match existing conditions. This item will be paid per linear meter of culvert.

2.5 Ditch – Between new Culvert 600 mm diam. and HWL

The Contractor must construct all ditches, as shown on drawings, including, but not limited to, excavation, stocking of re-usable materials on-site, disposal of unsuitable and surplus materials off-site and reinstatement of disturbed areas to existing conditions. This item will be paid per linear meter of ditch.

2.6 Rip-Rap Type 5

The Contractor must supply and install the proposed rip-rap Type 5, as specified on drawings, including geotextile. The minimum thickness of rip-rap must be as specified on drawings. This item will be paid per square meter (plan view).

The surface must be cleared of any trees, shrubs or branches and nonwoven geotextile, approved by the Engineer, must be placed before installation of the riprap. Materials must be placed from the bottom of the slope to the top, with successive layers, to avoid disturbances of the existing surface. The height of the material falling must be lower than 0.6 m to prevent damage to the geotextile fabric.

The Contractor must refer to section "ENVIRONMENTAL MEASURES" in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

2.7 Remove existing CSP culvert 1065 mm diam.

The Contractor must remove the existing CSP culvert, as shown on drawings. Work includes, without limitations, demolition, excavation, stocking of re-usable materials on-site, disposal of unsuitable and surplus materials off-site, removal of existing CSP culvert, excavation backfill, as well as the reconstruction of the existing access road to match existing conditions. This item will be paid per linear meter of culvert.

2.8 Backfill existing ditch at outlet CSP culvert 1065 mm diam.

The Contractor must backfill the existing ditch at the outlet of the existing CSP culvert 1065 mm diam. to be removed. Backfill must be placed such that positive drainage is reinstated in this area, as shown on drawings. This item will be paid as a lump sum.

3. SLOPE STABILITY

3.1 Cleaning of landslide and side slopes

The Contractor must clean the landslide area and side slopes from any debris, trees, branches, snow and other deleterious material to the satisfaction of the Geotechnical Engineer. Work includes, without limitations, the removal and disposal off-site of debris and trees. This item will be paid as a lump sum.

The Contractor must refer to section "ENVIRONMENTAL MEASURES" in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

3.2 Excavation of landslide side slopes

The Contractor must excavate landslide side slopes such that a maximum slope, as specified on drawings, are achieved to allow for proposed slope stability work (backfill), including, without limitations, stabilization and erosion control of the softened side slopes (geotextile, rip-rap, protective mulch, shrubs, etc.). This item will be paid as a lump sum.

The Contractor must refer to section “ENVIRONMENTAL MEASURES” in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

3.3 Geotextile

The Contractor must supply and install a geotextile, as specified on drawings. Work includes, without limitations, supply of materials, as well as the execution of the work (labor, machinery, etc.). This item will be paid per square meter of geotextile (plan view, without consideration of material overlap). This unit price also includes all expenses incurred for coordination with the supplier for delivery, unloading and storage of the geotextile on-site as well as for the installation of the geotextile. The fabric type, strength, filter layer and draining installation must be approved by the Engineer.

3.4 Backfill Landslide

The Contractor must backfill the landslide with excavation material provided from the site. The surface must be cleared of any trees, shrubs, branches and snow, and nonwoven geotextile fabric, approved by the Engineer, must be placed before installation of the backfill. Materials must be placed from the bottom of the slope to the top, with successive layers, to avoid disturbances of the existing surface. The height of the material falling must be lower than 0.6 m to prevent damage to the geotextile fabric.

This item will be paid as a lump sum. Work includes, without limitations, excavation backfill, construction of access roads, grading, supply and installation of materials, all as per drawings.

The Contractor must refer to section “ENVIRONMENTAL MEASURES” in the Engineering Specifications document for applicable environmental measures. The cost for the environmental measures implemented must be included in the specific item in the tender form.

4. REINSTATEMENT OF EXISTING CONDITIONS

4.1 Hydroseeding

Hydroseeding will be paid per square meter. Work includes, without limitations, grading, supply and installation of a wood fiber mat (or straw mat), topsoil, fertilizer and hyrdoseeding, as well as watering, all as per drawings. This work must be performed during weather conditions above freezing temperature and the unit price must include remobilization to the site, as required.

Work must be performed to the satisfaction of the NCC and, if required, repaired at the Contractor’s expense.

4.2 Trees and Shrubs

Trees and shrubs will be paid as a lump sum. The Contractor must refer to the section "ENVIRONMENTAL MEASURES" in the Engineering Specifications document and must evaluate the quantity of trees and shrubs required to complete the reinstatement of existing conditions (access roads, pipe inlet and outlet, etc.).

5. ENVIRONMENTAL MEASURES

Environmental measures will be paid as a lump sum. These measures are described under the section "ENVIRONMENTAL MEASURES" in the Engineering Specifications document.

ITEM 1 – General
ITEM 2 – Contractor Obligations
ITEM 3 – Environmental Protection Plan
ITEM 4 – Soil and Surface Water Protection
ITEM 5 – Migratory Bird Protection
ITEM 6 – Vegetation Protection
ITEM 7 – Erosion and Sediment Control on Site
ITEM 8 – Noise Protection
ITEM 9 – Air Quality
ITEM 10 – Archeology
ITEM 11 – Safety
ITEM 12 – Restoration
ITEM 13 – Penalties

6. MISCELLANEOUS

6.1 Shop Drawings

The Contractor must provide the Engineer with shop drawings of all products to be installed, including, but not limited to, the following:

- Temporary Works:
    I. Temporary Retaining Works
    II. Sedimentation Basin
    III. Sediment Traps
    IV. Filter Barrier
    V. Other Erosion and Sediment Control Measures (if any)
    VI. Access Roads
- Granular Materials

- Environmental Protection Action Plan (provided at start-up meeting)
- Health and Safety Plan

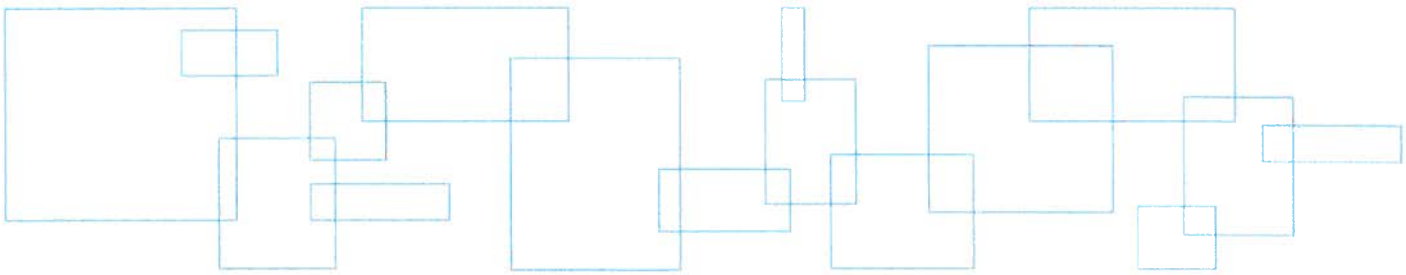
The Engineer must return approved of commented shop drawings within 48 hours. The cost for the preparation of shop drawings must be included in the cost of the products.

6.2 Geotechnical Information

Geotechnical information providing from LVM's geotechnical report have been included in the Engineering Specifications document.

Appendix 2

Explanation Notes on the Boring Log, Boring Logs



EXPLANATION NOTE ON SOUNDING LOGS

The following sounding logs summarize soils and rock geotechnical properties as well as ground water conditions, as collected during field work and/or obtained from laboratory tests. This note explains the different symbols and abbreviations used in these logs.

STRATIGRAPHIC UNITS

Elevation/Depth: Reference to the geodesic elevation of the soil or to a bench mark of arbitrary elevation, at the location of the sounding. Depth of the different geological boundaries as measured from ground surface. On the left, the scale is in meters while on the right, it is in feet.

Description of the stratigraphic units: Every geological formation is detailed.

The proportion of the different elements of the soil, defined according to the size of the particles, is given following the classification hereafter. The relative compactness of cohesionless soils is defined by the "N" index of the Standard Penetration Test. The consistency of cohesive soils is defined by their shear resistance.

Classification	Particle size (mm)
Clay	< 0.002
Clay and silt (undifferentiated)	< 0.08
Sand	0.08 to 5
Gravel	5 to 80
Cobble	80 to 300
Boulder	> 300

Descriptive terminology	Proportion (%)
"Traces" (tr.)	1 to 10
"Some" (s.)	10 to 20
Adjective (ex.: sandy, silty)	20 to 35
"And" (ex.: sand and gravel)	35 to 50

Compactness of cohesionless soils	Standard Penetration Test index ("N" value), ASTM D-1586 (blows for a 300mm penetration)
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	> 50

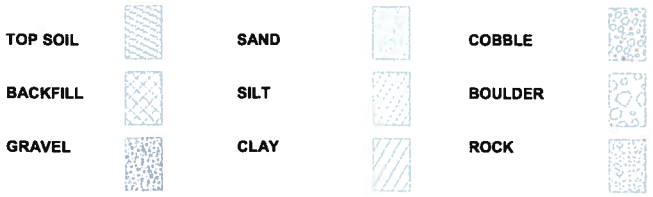
Consistency of cohesive soils	Undrained shear strength (kPa)
Very soft	< 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	> 200

Plasticity of cohesive soils	Liquid limit (%)
Low	< 30
Medium	30 to 50
High	> 50

Sensitivity of cohesive soils	$S_t = (C_u/C_{ur})$
Low	$S_t < 2$
Medium	$2 < S_t < 4$
High	$4 < S_t < 8$
Extra-sensitive	$8 < S_t < 16$
Quick (sensitive) clay	$S_t > 16$

Classification of rock	RQD (%)
Very poor quality	< 25
Poor quality	25 to 50
Fair quality	50 to 75
Good quality	75 to 90
Excellent quality	90 to 100

SYMBOLS



WATER LEVEL

This column shows the ground water level, as measured at a given time during the geotechnical investigation. The details of the installation (type and depth) are also illustrated in this column.

SAMPLES

Type and number: Each sample is labelled in accordance with the number of this column and the given notation refers to samples types.

Sub-sample: When a sample contains two or more different stratigraphic units, it is sometimes necessary to separate it and create sub-samples. This column allows for the identification of the latter and the association to *in situ* or laboratory measurements to these sub-samples.

Condition: The position, length and condition of each sample are shown in this column. The symbol shows the condition of the sample, following the legend given on the sounding log.

Size: This column indicates the split spoon sampler size.

"N" index The standard penetration index shown in this column is expressed with the letter "N". This index is obtained with the Standard Penetration Test. It corresponds to the number of blows required to drive the last 300mm of the split spoon, using a 622 Newton hammer falling freely from a height of 762mm (ASTM D-1586). For a 610mm long split spoon, the "N" index is obtained by adding the number of blows required for the driving of the 2nd and 3rd 150mm of the split spoon. Refusal (R) indicates a number of blows greater than 100. A set of numbers such as 28-30-50/60mm indicates that the number of blows required to drive the 1st and 2nd 150mm of the split spoon are respectively 28 and 30. Moreover, it indicates that 50 blows were necessary to get a penetration of 60mm, whereupon the test was suspended.

RQD index: Rock Quality Designation index: This index is defined as the ratio between the total length of all rock cores of 100mm and more in length over the total length of the core run. The RQD index is an indirect measurement of the number of "natural" fractures and of the amount of the alteration in a rock mass.

TESTS

Results: This column shows, for the corresponding depth, the results of tests carried out in the field or in the laboratory (shear strength, dynamic penetration, Atterberg limits with the cone, etc.). For more information, please refer to the legend in the upper part of the sounding log. However, an abbreviation indicating the type of analysis performed is shown next to the sample tested.

Graph: This graph shows the undrained shear strength resistance of cohesive soils, as measured *in situ* or in the laboratory (NQ 2501-200). It is also used to present the Dynamic Cone Penetration Test (NQ 2501-145) results.

Moreover, this graph is used for the representation of the water content and Atterberg limits test results.

LVM

Client :

National Capital Commission

BOREHOLE REPORT

File n°: **P039908-0102**
Borehole n°: **BH-01-11**
Date: **2011-08-05**

Project: **Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area**

Location: **Gatineau Park, Gatineau, Qc**

Coordinates (m): North 5048162.0 (Y); East 336519.0 (X); Elevation **0.00 (Z)**

Bedrock: m End depth: 7.92 m

Sample condition

Intact | Remoulded | Lost | Core

Organoleptic soil examination:

Visual aspect: Non-existent(N); Disseminated(D); Soaked(S)
Odor: Non-existent(N); Light(L); Medium(M); Persistent(P)

Sample type

SS	Split Spoon
TM	Thin wall Tube
PS	Piston Tube
RC	Rock core
TA	Auger
MA	Bulk sample
TU	Transparent tube
PW	LVM Mega-Sampler
FG	Frozen ground

Tests

L	Consistency Limits	O.M.	Organic Matter (%)		Water Level
W_L	Liquid Limit (%)	K	Permeability (cm/s)	N	Std Penetration test (blows/300mm)
W_P	Plastic Limit (%)	UW	Unit Weight (kN/m³)	N_C	Dyn. Penetration test (blows/300mm) ●
I_P	Plasticity Index (%)	A	Absorption (l/min. m)	σ'_P	Preconsolidation Pressure (kPa)
I_L	Liquidity Index	U	Uniaxial Compressive strength (MPa)	SCI	Soil Corrosivity Index
W	Natural Water Content (%)	RQD	Rock Quality Designation (%)		
GS	Grain Size Analysis	CA	Chemical Analysis		**Undrained shear strength** (Field ▲ / Laboratory ■)
S	Hydrometer analysis	P_L	Limit Pressure (kPa)	C_U	Undisturbed (kPa) ▲ ■
R	Refusal	E_M	Pressuremeter Modulus (MPa)	C_{UR}	Remoulded (kPa) △ □
VBS	Methylene Blue Value	E_r	Modulus of subgrade reaction (MPa)		
WR	Weight of Rods	SP_o	Segregation Potential (mm²/H °C)		

DEPTH - ft	DEPTH - m	ELEVATION - m / DEPTH - m	SOIL OR BEDROCK DESCRIPTION	SYMBOLS	WATER LEVEL (m) / DATE	TYPE AND NUMBER	SUB-SAMPLE	CONDITION	SIZE	RECOVERY %	Blows/150mm	"N" or RQD	Organo. Exam: Odor	Organo. Exam: Visual	RESULTS
		0.00													
1		0.00	Topsoil, brown silty sand with some organic matter.			SS-1				82	1-3 4-4	7			
2		-0.61													
		0.61	Loose brown sand to silty sand.												
3	1					SS-2				25	4-4 4-4	8			
4							A								
5					el. -1.95 m 2011-09-28	SS-3	B			74	5-6 5-6	11			
6															
7	2					SS-4				74	6-6 6-7	12			
8															
9						SS-5				74	8-7 7-8	14			
10	3														
11						SS-6				90	7-7 6-4	13			GS
12															
13	4					SS-7				82	8-7 7-8	14			
14															
15						SS-8				90	11-9 9-9	18			
16		-4.88													
	5	4.88	Non plastic grey clay with some sand.				A								
17						SS-9	B			100	7-4 5-9	9			
		-5.49													
18		5.49	Dense brown fine silty sand.												
19						SS-10				90	8-8 6-7	14			

NATURAL WATER CONTENT AND LIMITS (%) — Wp W WL — 20 40 60 80 100 120

UNDRAINED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION — 20 40 60 80 100 120

Vertical Scale = 1 : 50

Remarks:

Borehole type:

Boring equipment: **Geoprobe**

Prepared by: **M. Keita**

Approved by: **Y. Coulibaly, Eng., P. Eng.**

2011-10-07

LVM

Client :

National Capital Commission

BOREHOLE REPORT

File n°: **P039908-0102**
Borehole n°: **BH-01-11**
Date: **2011-08-05**

Project: **Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area**

Location: **Gatineau Park, Gatineau, Qc**

Coordinates (m): North 5048162.0 (Y)
East 336519.0 (X)
Elevation **0.00 (Z)**
Bedrock: m End depth: 7.92 m

DEPTH - ft	DEPTH - m	LITHOLOGY: ELEVATION - m / DEPTH - m	SOIL OR BEDROCK DESCRIPTION	SYMBOLS	WATER LEVEL (m) / DATE	SAMPLES: TYPE AND NUMBER	SUB-SAMPLE	CONDITION	SIZE	RECOVERY %	Blows/150mm	"N" or RQD	Organo. Exam: Odor	Organo. Exam: Visual	RESULTS	FIELD AND LABORATORY TESTS
20			Dense brown fine silty sand.													
21						SS-11				100	8-8 8-8	16				
22																
23	7					SS-12				100	9-7 7-8	14				
24																
25						SS-13				100	9-7 7-8	14				
26	8	-7.92 / 7.92	End of borehole.													
27																
28																
29	9															
30																
31																
32																
33	10															
34																
35																
36	11															
37																
38																
39	12															
40																
41																
42																
43	13															
44																
45																
46	14															
47																
48																

NATURAL WATER CONTENT AND LIMITS (%) — Wp W WL — 20 40 60 80 100 120

UNDRAINDED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION — 20 40 60 80 100 120

Vertical Scale = 1 : 50

Remarks:

Borehole type:

Boring equipment: **Geoprobe**

Prepared by: **M. Keita**

Approved by: **Y. Coulibaly, Eng., P. Eng.**

2011-10-07

Client : **National Capital Commission**

BOREHOLE REPORT

File n°: **P039908-0102**
Borehole n°: **BH-02-11**
Date: **2011-08-05**

Project: **Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area**

Location: **Gatineau Park, Gatineau, Qc**

Coordinates (m): North 5048146.0 (Y); East 336508.0 (X); Elevation **0.00 (Z)**

Bedrock: m End depth: 10.36 m

Sample condition

Intact | Remoulded | Lost | Core

Organoleptic soil examination:
Visual aspect: Non-existent(N); Disseminated(D); Soaked(S)
Odor: Non-existent(N); Light(L); Medium(M); Persistent(P)

Sample type

SS	Split Spoon
TM	Thin wall Tube
PS	Piston Tube
RC	Rock core
TA	Auger
MA	Bulk sample
TU	Transparent tube
PW	LVM Mega-Sampler
FG	Frozen ground

Tests

L	Consistency Limits	O.M.	Organic Matter (%)		Water Level
W_L	Liquid Limit (%)	K	Permeability (cm/s)	N	Std Penetration test (blows/300mm)
W_P	Plastic Limit (%)	UW	Unit Weight (kN/m³)	N_C	Dyn. Penetration test (blows/300mm) ●
I_P	Plasticity Index (%)	A	Absorption (l/min. m)	σ'_P	Preconsolidation Pressure (kPa)
I_L	Liquidity Index	U	Uniaxial Compressive strength (MPa)	SCI	Soil Corrosivity Index
W	Natural Water Content (%)	RQD	Rock Quality Designation (%)		
GS	Grain Size Analysis	CA	Chemical Analysis		**Undrained shear strength** (Field / Laboratory)
S	Hydrometer analysis	P_L	Limit Pressure (kPa)	C_U	Undisturbed (kPa) ▲ ■
R	Refusal	E_M	Pressuremeter Modulus (MPa)	C_{UR}	Remoulded (kPa) △ □
VBS	Methylene Blue Value	E_r	Modulus of subgrade reaction (MPa)		
WR	Weight of Rods	SP_0	Segregation Potential (mm²/H °C)		

DEPTH - ft	DEPTH - m	ELEVATION - m / DEPTH - m	SOIL OR BEDROCK DESCRIPTION	SYMBOLS	WATER LEVEL (m) / DATE	TYPE AND NUMBER	SUB-SAMPLE	CONDITION	SIZE	RECOVERY %	Blows/150mm	"N" or RQD	Organo. Exam: Odor	Organo. Exam: Visual	RESULTS
		0.00													
		0.00	Beginning of the dynamic penetration test.												
1															N_C= 3
2															N_C= 4
3	1														N_C= 5
4															N_C= 4
5															N_C= 7
6															N_C= 10
7	2														N_C= 10
8															N_C= 11
9															N_C= 13
10	3														N_C= 14
11															N_C= 15
12															N_C= 8
13	4														N_C= 13
14															N_C= 13
15															N_C= 17
16	5														N_C= 16
17															N_C= 11
18															N_C= 12
19															N_C= 17

FIELD AND LABORATORY TESTS

NATURAL WATER CONTENT AND LIMITS (%): Wp W WL — 20 40 60 80 100 120

UNDRAINED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION — 20 40 60 80 100 120

Vertical Scale = 1 : 50

Remarks:

Borehole type:

Boring equipment: **Geoprobe**

Prepared by: **M. Keita**

Approved by: **Y. Coulibaly, Eng., P. Eng.**

2011-10-07

LVM

Client : **National Capital Commission**

BOREHOLE REPORT

File n°: **P039908-0102**
Borehole n°: **BH-02-11**
Date: **2011-08-05**

Project: **Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area**

Location: **Gatineau Park, Gatineau, Qc**

Coordinates (m): North 5048146.0 (Y)
East 336508.0 (X)
Elevation **0.00 (Z)**
Bedrock: m End depth: 10.36 m

DEPTH - ft	DEPTH - m	LITHOLOGY: ELEVATION - m / DEPTH - m	LITHOLOGY: SOIL OR BEDROCK DESCRIPTION	LITHOLOGY: SYMBOLS	WATER LEVEL (m) / DATE	SAMPLES: TYPE AND NUMBER	SUB-SAMPLE	CONDITION	SIZE	RECOVERY %	Blows/150mm	"N" or RQD	Organo. Exam: Odor	Organo. Exam: Visual	FIELD AND LABORATORY TESTS: RESULTS	NATURAL WATER CONTENT AND LIMITS (%) Wp W WL; UNDRAINDED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION
20															N_c= 31	20 40 60 80 100 120
21															N_c= 24	
22															N_c= 20	
23	7														N_c= 19	
24															N_c= 20	
25															N_c= 19	
26	8														N_c= 18	
27															N_c= 18	
28															N_c= 17	
29	9														N_c= 20	
30															N_c= 18	
31															N_c= 14	
32															N_c= 20	
33	10														N_c= 95	
34		-10.36													N_c= 101	
35		10.36	End of the dynamic penetration test after a refusal on probable bedrock.													
36	11															
37																
38																
39	12															
40																
41																
42																
43	13															
44																
45																
46	14															
47																
48																

Vertical Scale = 1 : 50

Remarks:

Borehole type:

Boring equipment: **Geoprobe**

Prepared by: **M. Keita**

Approved by: **Y. Coulibaly, Eng., P. Eng.**

2011-10-07

Client : **National Capital Commission**

BOREHOLE REPORT

File n°: **P039908-0102**
Borehole n°: **BH-03-11**
Date: **2011-08-05**

Project: **Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area**
Location: **Gatineau Park, Gatineau, Qc**

Coordinates (m): North 5048131.0 (Y); East 336492.0 (X); Elevation **0.00 (Z)**
Bedrock: m End depth: 21.03 m

Sample condition: Intact; Remoulded; Lost; Core

Organoleptic soil examination:
Visual aspect: Non-existent(N); Disseminated(D); Soaked(S)
Odor: Non-existent(N); Light(L); Medium(M); Persistent(P)

Sample type

SS	Split Spoon
TM	Thin wall Tube
PS	Piston Tube
RC	Rock core
TA	Auger
MA	Bulk sample
TU	Transparent tube
PW	LVM Mega-Sampler
FG	Frozen ground

Tests

L	Consistency Limits	O.M.	Organic Matter (%)		Water Level
W_L	Liquid Limit (%)	K	Permeability (cm/s)	N	Std Penetration test (blows/300mm)
W_P	Plastic Limit (%)	UW	Unit Weight (kN/m³)	N_C	Dyn. Penetration test (blows/300mm)
I_P	Plasticity Index (%)	A	Absorption (l/min. m)	σ'_P	Preconsolidation Pressure (kPa)
I_L	Liquidity Index	U	Uniaxial Compressive strength (MPa)	SCI	Soil Corrosivity Index
W	Natural Water Content (%)	RQD	Rock Quality Designation (%)		
GS	Grain Size Analysis	CA	Chemical Analysis		
S	Hydrometer analysis	P_L	Limit Pressure (kPa)		
R	Refusal	E_M	Pressuremeter Modulus (MPa)		
VBS	Methylene Blue Value	E_r	Modulus of subgrade reaction (MPa)		
WR	Weight of Rods	SP_0	Segregation Potential (mm²/H °C)		

Undrained shear strength (Field / Laboratory)
C_U Undisturbed (kPa) ▲ ■
C_{UR} Remoulded (kPa) △ □

DEPTH - ft	DEPTH - m	ELEVATION - m / DEPTH - m	SOIL OR BEDROCK DESCRIPTION	SYMBOLS	WATER LEVEL (m) / DATE	TYPE AND NUMBER	SUB-SAMPLE	CONDITION	SIZE	RECOVERY %	Blows/150mm	"N" or RQD	Organo. Exam: Odor	Organo. Exam: Visual	RESULTS
		0.00													
1		0.00	Fine sand with some organic matter.			SS-1	A			75	2-6 4-5	10			
		-0.61					B								
2		0.61	Grey fine sand and traces of clay and silt.			SS-2	A			83	5-4 2-6	6			
3	1	-1.00					B								
4		1.00	Non plastic grey clay with some sand.			SS-3	A			83	7-9 8-7	17			
		-1.22	Loose to firme sand				B								
5		1.22													
6		-2.00					A								
7	2	2.00	Non plastic grey clay and traces of sand.			SS-4	B			100	11-5 6-10	11			
		-2.30					C								
8		2.30	Loose brown sand and traces of clay.				A								
		-2.44				SS-5				100	7-6 10-12	16			
9		2.44	Non pastic grey clay and traces of sand.				B								
		-2.80					A								
10	3	2.80	Silty loose brown sand.			SS-6	B			83	8-10 10-10	20			
11															
12						SS-7				92	8-9 9-13	18			
13	4														
14						SS-8				83	12-12 11-10	23			
15															
16	5					SS-9				83	7-3 5-11	8			GS
17															
18						SS-10				83	12-11 11-12	22			
19															

NATURAL WATER CONTENT AND LIMITS (%) — Wp W WL — 20 40 60 80 100 120

UNDRAINED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION — 20 40 60 80 100 120

Vertical Scale = 1 : 50

Remarks:

Borehole type:

Boring equipment: **Geoprobe**

Prepared by: **M. Keita**

Approved by: **Y. Coulibaly, Eng., P. Eng.**

2011-10-07

LVM

Client :

National Capital Commission

BOREHOLE REPORT

File n°: **P039908-0102**
Borehole n°: **BH-03-11**
Date: **2011-08-05**

Project: **Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area**

Location: **Gatineau Park, Gatineau, Qc**

Coordinates (m): North 5048131.0 (Y)
East 336492.0 (X)
Elevation **0.00 (Z)**
Bedrock: m End depth: 21.03 m

DEPTH - ft	DEPTH - m	LITHOLOGY: ELEVATION - m / DEPTH - m	LITHOLOGY: SOIL OR BEDROCK DESCRIPTION	LITHOLOGY: SYMBOLS	WATER LEVEL (m) / DATE	SAMPLES: TYPE AND NUMBER	SAMPLES: SUB-SAMPLE	SAMPLES: CONDITION	SAMPLES: SIZE	SAMPLES: RECOVERY %	SAMPLES: Blows/150mm	SAMPLES: "N" or RQD	SAMPLES: Organo. Exam: Odor	SAMPLES: Organo. Exam: Visual	FIELD AND LABORATORY TESTS: RESULTS	FIELD AND LABORATORY TESTS: NATURAL WATER CONTENT AND LIMITS (%) Wp W WL; UNDRAINED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION
20		6.10	Plastic clay and fine sand, saturated.			SS-11				83	11-6 7-6	13				
21																
22																
23	7					SS-12				100	2-2 2-2	4				
24																
25						SS-13				100	2-3 3-2	6				
26	8	-7.92 7.92	End of sampling and beginning of the dynamic penetration tests.													
27															N_c= 2	
28															N_c= 14	
29	9														N_c= 18	
30															N_c= 17	
31															N_c= 18	
32															N_c= 18	
33	10														N_c= 18	
34															N_c= 22	
35															N_c= 21	
36	11														N_c= 17	
37															N_c= 29	
38															N_c= 30	
39	12														N_c= 30	
40															N_c= 34	
41															N_c= 32	
42															N_c= 31	
43	13														N_c= 36	
44															N_c= 32	
45															N_c= 33	
46	14														N_c= 33	
47															N_c= 36	
48															N_c= 36	

Vertical Scale = 1 : 50

Remarks:

Borehole type:

Boring equipment: **Geoprobe**

Prepared by: **M. Keita**

Approved by: **Y. Coulibaly, Eng., P. Eng.**

2011-10-07

Client : **National Capital Commission**

BOREHOLE REPORT

File n°: **P039908-0102**
Borehole n°: **BH-03-11**
Date: **2011-08-05**

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Location: **Gatineau Park, Gatineau, Qc**

Coordinates (m): North 5048131.0 (Y)
East 336492.0 (X)
Elevation **0.00 (Z)**
Bedrock: m End depth: 21.03 m

DEPTH - ft	DEPTH - m	ELEVATION - m / DEPTH - m	SOIL OR BEDROCK DESCRIPTION	SYMBOLS	WATER LEVEL (m) / DATE	TYPE AND NUMBER	SUB-SAMPLE	CONDITION	SIZE	RECOVERY %	Blows/150mm	"N" or RQD	Organo. Exam: Odor	Organo. Exam: Visual	RESULTS
49			Dynamic penetration tests.												N_c= 32
50															N_c= 27
51															N_c= 20
52	16														N_c= 15
53															N_c= 15
54															N_c= 17
55															N_c= 17
56	17														N_c= 17
57															N_c= 22
58															N_c= 23
59	18														N_c= 30
60															N_c= 47
61															N_c= 53
62	19														N_c= 64
63															N_c= 64
64															N_c= 64
65	20														N_c= 64
66															N_c= 70
67															N_c= 70
68															N_c= 89
69	21	-21.03													
70		21.03	End of borehole after obtaining a refusal.												N_c= 102
71															
72	22														
73															
74															
75	23														
76															
77															

NATURAL WATER CONTENT AND LIMITS (%) — Wp W WL — 20 40 60 80 100 120

UNDRAINDED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION — 20 40 60 80 100 120

Vertical Scale = 1 : 50

Remarks:

Borehole type:

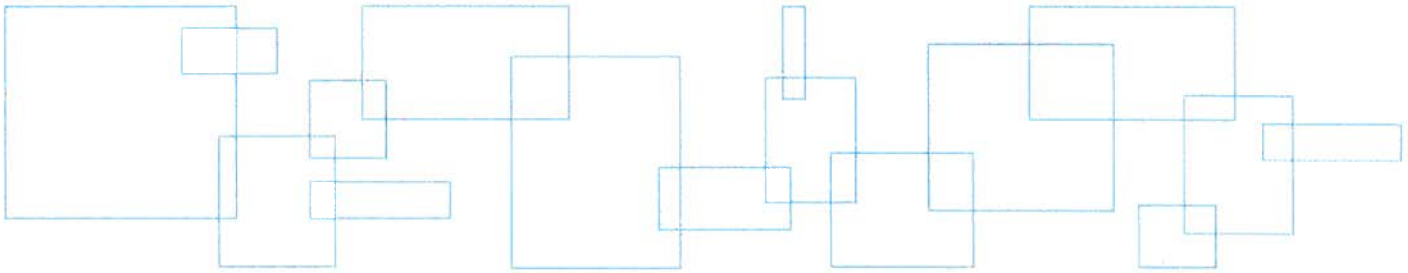
Boring equipment: **Geoprobe**

Prepared by: **M. Keita**

Approved by: **Y. Coulibaly, Eng., P. Eng.**

2011-10-07

Appendix 3 Laboratory Tests



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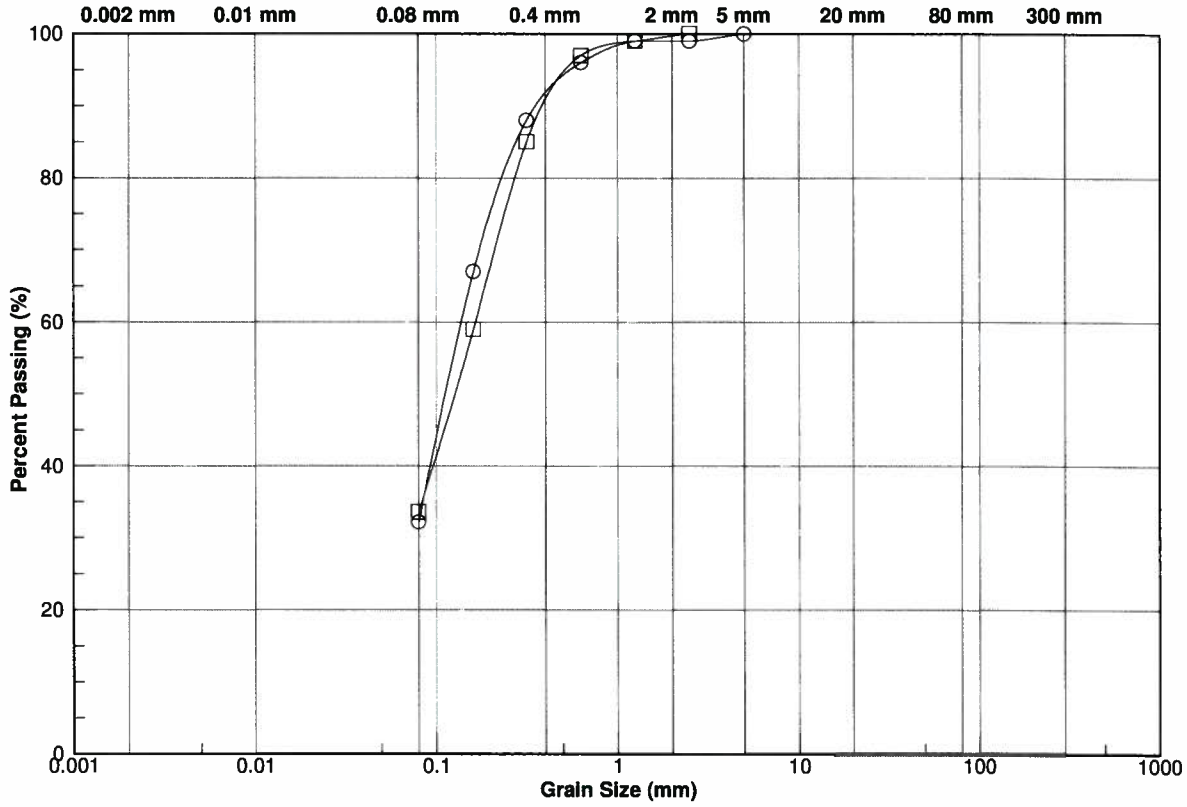
GRAIN-SIZE ANALYSIS

Project: **Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area** Figure n° : **1**

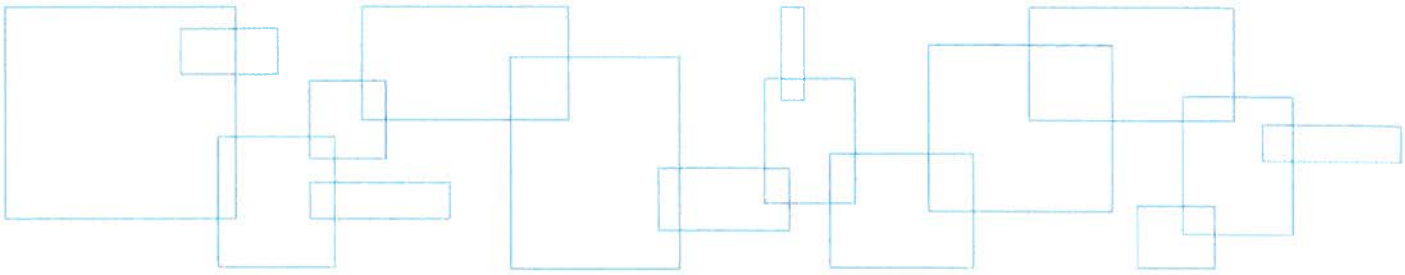
Location: **Gatineau Park, Gatineau, Qc** File n° : **P039908-0102**

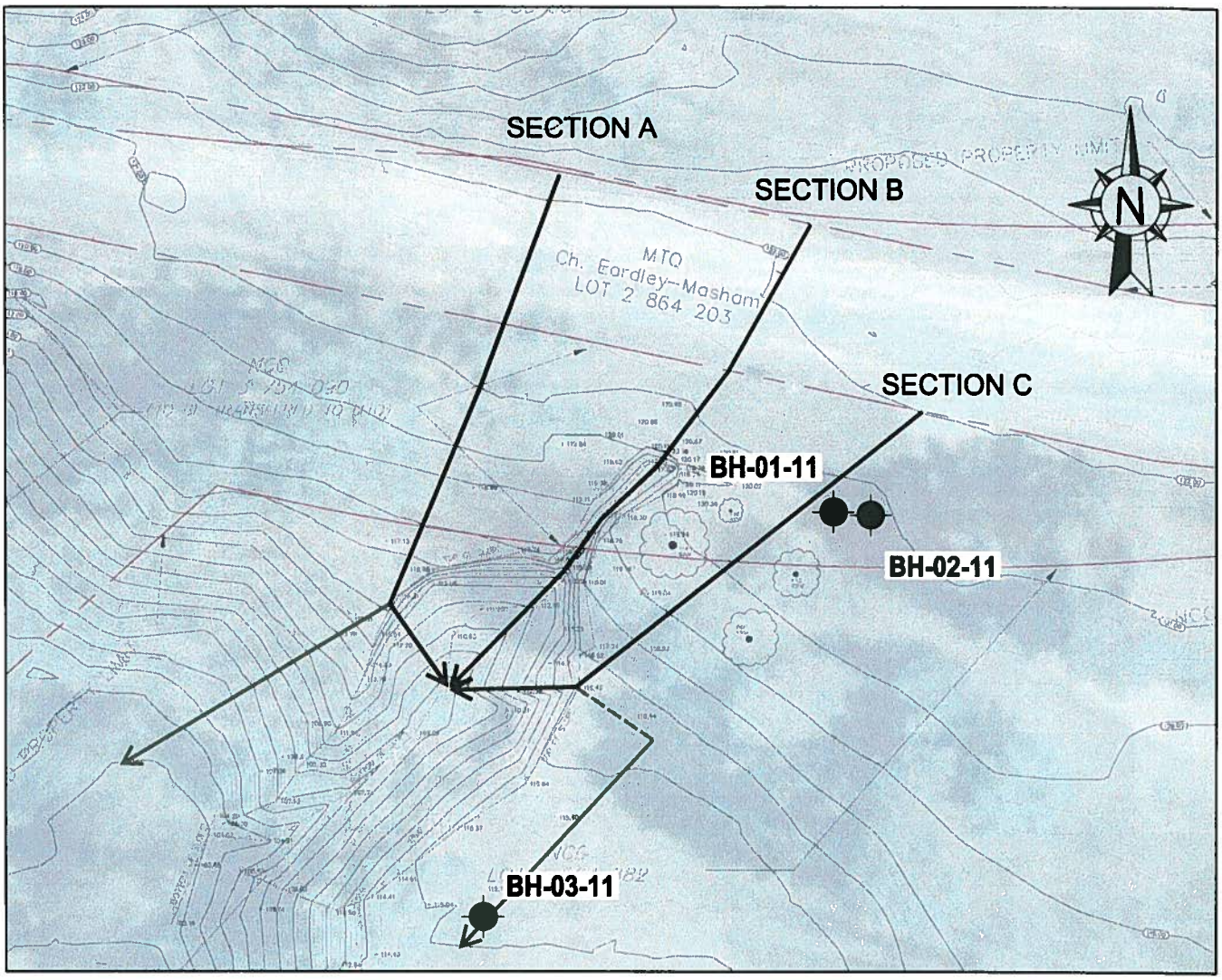


CLAY	SILT	SAND			GRAVEL		COBBLE	BOULDER
		FINE	MEDIUM	COARSE	FINE	COARSE		

Symbol	Borehole n°	Sample n°	Depth (m)	Description	USCS class. (ASTM D-2487)
—○—	BH-01-11	SS-6	3.05 - 3.66	N/A	N/A
—□—	BH-03-11	SS-9	4.88 - 5.49	N/A	N/A

Appendix 4 Plan of borehole and cross-sections locations





This document must be used jointly with the recommendations formulated in the geotechnical study report

LEGEND :

BH-NN-AA BOREHOLE-NUMBER-YEAR

SURVEY COORDINATES (MTM)

BOREHOLE	NORTH (Y)	EAST (X)
BH-01-11	5048162*	336519*
BH-02-11	5048146*	336508*
BH-03-11	5048131*	336492*

*Error margin is ± 5 m

Project

National Capital Commission

Church Hill area - Slope Stability Study on Eardley Road, near Church Hill Picnic Area

Gatineau Park, Gatineau, Qc

Title

Sections Study Location

LVM inc.
900, de la Carrière Blvd, Suite 100
Gatineau (Quebec) J8Y 6T5
Telephone : 819.778.3143
Fax : 819.770.1373

Prepared	M. Kelta	Discipline	GEOTECHNICAL	Project manager	Y. Coulibaly
Drawn	R. Frenette	Scale	Aucune	Sequence no.	Rev. 00
Checked	T. Lampon	Date	2011-10-03		

M. dept.	Project	Work pckg.	Sub-w.p.	Disc.	Drawing no.	Rev.
033	P039908	0102	000	GE	0001	00

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TABLE OF CONTENTS

1. GENERAL

This section describes the requirements relative to environmental protection. The Contractor must comply with the requirements in this document. The abbreviation NCC refers to the National Capital Commission.

2. CONTRACTOR OBLIGATIONS

The Contractor must comply with the recommendations issued by the Department of Fisheries and Oceans Canada (DFO).

If the Contractor, by way of his work methods, needs to perform tasks outside the authority of the NCC, prior documented approval is required from the relevant authorities. The Contractor will provide a copy of these documents to the Supervisor. Additionally the Contractor must include the costs involved in obtaining permits and compliance requirements in his estimate, including delays in obtaining these approvals.

3. ENVIRONMENTAL PROTECTION ACTION PLAN

At the first project meeting the Contractor must submit the environmental protection action plan to the Supervisor. This plan will clearly outline the methodology through which the Contractor will implement the actions required. If certain elements of the plan require clarification, they must be presented to the Supervisor for approval before work begins.

The action plan must include the following elements:

- The identification of those responsible for environment protection;
- How the employees of the Contractor will be informed of the pro-active measures required to protect the Environment;
- The emergency measures that would be implemented by the Contractor in case of oil or toxic material spillage;
- Work Schedules;
- Sketches showing :
  - → The on-site location of environmental protection devices which will be used;
  - → The on-site location of temporary fencing determining the perimeter of the work area;
  - → The on-site location of temporary structures to be constructed in the creek or on its banks;
  - → The on-site location of parking areas, construction trailers, storage areas, refuelling stations and areas of mechanical maintenance;
  - → Areas of vegetation to be restored.
- Detailed descriptions of:
  - → Temporary structures which will be located in the creek or its banks, if any;

- How the weather will be measured on site, including measurements taken in heavy rainfall;
- Management plan for different types of residual materials.

Prior to beginning the project the Contractor must have in his possession, on site, all of the equipment needed to realize the procedures outlined in this quote. The Contractor must respond immediately to any event deemed harmful by the Supervisor or likely to cause environmental damage.

4. SOIL AND SURFACE WATER PROTECTION

4.1 Keeping the Site Clean

The Contractor shall provide all the necessary equipment (portable toilets, garbage cans, tubs…etc) to prevent the spreading of waste into the surrounding environment.

Materials and waste must be disposed of outside Park boundaries, at a site authorized by the Ministry of Sustainable Development, Environment and Parks.

Any debris which falls into the creek must be recovered immediately.

4.2 Machinery Traffic

It is prohibited to have any machinery in creek.

The Contractor must use equipment suitable for the bearing capacity of the soil.

The movement of machinery must be restricted to existing roads and the proposed temporary access road.

The movement of machinery on the shore of the creek must be limited to the minimum requirement for completion of work.

Machinery shall be operated so as to avoid or minimize disturbances to the stream bank.

4.3 Refuelling and Mechanical Maintenance

Refuelling, mechanical inspection, the cleaning of (rolling) vehicles, as well as handling and storage of hydrocarbons must be carried out in places where there is no risk of contamination to the water environment and at a minimum distance of 60 meters from a lake, a stream or a wetland.

The Contractor shall provide in each supply area : absorbent materials, as well as airtight containers for recovering petroleum products and waste. The containers containing petroleum products must be clearly identified.

4.4 Oil Spills

The Contractor must comply with the following conditions to prevent oil spills or contain them if necessary:

- The Contractor must ensure that the equipment is clean and free of leaks upon arrival at the site and continue to maintain that standard by conducting regular inspections, maintenance and repairs thereafter;
- No machinery or gas-powered equipment should remain on a bulkhead or within 60 meters of a stream, lake or wetland during off-hours construction.

The inability to meet this requirement will result in the implementation of environmental protection measures (monitoring or other);

- An emergency kit for recovering petroleum products must be permanently available on site. The kit must include at least 30 meters of absorbent materials, a floating boom with a length of at least 30 meters, one box of absorbent pads, shovels, an empty 45 gallon barrel, rope and absorbent in solid form (powder or granules). The kit should be stored near the work and machinery and be easily accessible at all times for rapid response;
- Recovery bins should be placed under all stationary equipment that leak or require refuelling, including generators. The accumulated water in these tanks must be emptied regularly and disposed of in accordance with the standards of the Ministry of Sustainable Development, the Environment and Parks;
- During an accidental release of contaminants, the affected site must be cleaned immediately. The construction Supervisor, the Emergency Service department of the NCC (613-239-5353), the NCC project manager and the Province of Quebec's Environmental Emergency department (1-866-694-5454) must be notified directly;
- A list of resource personnel and organizations to contact in case of emergency must be posted in a visible place on site throughout the construction period.

4.5 Materials

The Contractor must use clean and non-contaminated materials.

The quality of the soil brought to the site must be equal to or greater than the quality of the soil already on the site.

All temporary structures, if any, must be constructed of materials free of fine particles and contaminants.

4.6 Management and Storage of Materials, Debris and Waste

The Contractor shall observe the following as part of the management and storage of materials, debris and waste on site:

- All temporary storage sites must be located in an area closed to traffic or in the parking lot at a minimum of 40 m from the work area, on the main road;
- All snow removed from the work area must be stockpiled at least 60 m from any stream, ditch or wetland;
- It is prohibited to store, even temporarily, hazardous materials or contaminants (oil, paint, solvents, etc) near a ditch and within 60m of a stream, ditch or wetland;
- A management plan for different types of residual materials should be developed by the Contractor and approved by the construction Supervisor;
- The Contractor must create separate piles for materials, soils and wastes based on whether they are hazardous, contaminated or not;

- The Contractor shall implement the 3R[1]s principle in the management of waste, scrap and surplus excavated material - disposal should be the last option;
- The surplus excavated materials and waste, if disposed, must be disposed of in a site that meets the requirements of the Ministry of Sustainable Development, Environment and Parks;
- The dumping of waste or garbage in a stream, a wetland or on their banks is strictly prohibited;
- No natural material can be dumped on site without permission from the NCC;
- Wood debris should be reused[2], recovered, or disposed off site at a site authorized by the Ministry of Sustainable Development, Environment and Parks and the construction Supervisor;
- No waste can be left on site. The Contractor is responsible for collecting garbage in proper containers;
- Storage and disposal sites provided by the Contractor are subject to approval by the Supervisor prior to work beginning, to ensure compliance with the standards and requirements in effect.

5. MIGRATORY BIRD PROTECTION

All clearing and deforestation should occur between August 16th and March 31st to avoid the breeding and nesting season of migratory birds.

Should work be required outside this period the Contractor must obtain approval and recommendations from the NCC prior to clearing and deforestation.

6. VEGETATION PROTECTION

Prior to the cutting of any vegetation, the project Supervisor must first outline the perimeter of the work area. Once approved, the perimeter must be lined by temporary fencing.

The Contractor must keep the cutting of vegetation to a strict minimum, including vegetation which interferes with the project itself. The cutting must be preformed prior to the starting of earthwork and excavation. No trees or other debris should fall into stream. Should debris fall into stream or wetland areas, the debris must be removed immediately by the least intrusive method available.

It is prohibited to cut vegetation to create storage sites for materials, waste, machinery or equipment.

The Contractor shall avoid uprooting vegetation. It must focus on pruning and topping.

7. EROSION AND SEDIMENT CONTROL ON SITE

[1] Reduce, Reuse and Recycle.
For details please consult www.recyc-quebec.gouv.qc.ca/Client/fr/gerer/travail/dechet-boulot/3rv.html
[2] They are reusable in shredded form only.

The Contractor shall implement the following measures to control erosion and sediments on site;

- Runoff water from outside the work area must be intercepted and re-directed to a settling pond or a vegetation zone more than 30 meters away from streams or wetlands;
- It is forbidden to perform earthwork or excavation near streams or wetlands during periods of flooding or heavy rain;
- A tarp should cover the extra excavation and unconsolidated material stored in the work area at the end of the day;
- A geotextile membrane must cover the wells located within the perimeter of the work area and those identified by the Supervisor for the duration of the work period;
- The principles of good environmental protection must be implemented and maintained in good standing for the duration of the work period;
- The water pump from the dewatering area must be directed at a settling pond, or towards an area of dense vegetation located more than 30 meters from streams or wetlands. The water should be returned to streams only when they have no suspended solids;
- When the water pump from the dewatering area is directed to a vegetation zone, a geotextile membrane covered with clean stones must be set up under the end of the hose where the water drains.

In order to avoid any distribution of suspended solids in streams, the Contractor shall implement the following provisions prior to starting work:

7.1 Sediment Barriers

In accordance with Standard Drawing II-9-14 (Appendix 1), the Contractor must put in place sediment barriers across ditches and along streams and other locations required by the Supervisor;

In accordance with Standard Drawing II-9-14, the geotextile membrane must be mounted on wooden posts 1450 millimetres in length, installed at a maximum spacing of 1.5 meters.

The installation of sediment barriers should include the flowing steps;

- Dig a trench between 100-150mm deep and 150 wide in the proposed barrier;
- Push the poles next to the trench (the side of the stream or wetland), with the exception of the last post;
- Unroll the membrane along the fence line;
- Expand the base of the membrane in the trench to a width of 150mm;
- Hang the membrane, making sure the bottom of the membrane is placed well into the trench;
- Attach the membrane between posts;
- Attach the last post to the membrane;
- Cover the bottom of the membrane with compacted soil.

Sediment barriers must be removed and recovered only when reworked surfaces are permanently stabilized, including re-vegetation.

7.2 Turbidity Curtain

The Contractor shall install turbidity curtains[3] in the creek downstream from construction below the high water line (HWL) to capture suspended fine materials;

The components of the turbidity curtain and their installation in the creek must conform to Figures 1 and 2 (Appendix 2). The curtains should have openings of less than 0.060mm filtration. Turbidity curtains should be installed more than 5 meters away from the work zone under the natural high water line of the creek and at a height adjusted to that of the current water line present in the creek.

Before the silt curtains can be removed, captured sediment must be recovered and disposed of in an approved location.

8. NOISE PROTECTION

The noise level emitted by all equipment and machinery must be in compliance with the regulations of the municipality of Pontiac.

The days of construction are Monday through Friday (inclusive) from 7:00am until 9:00pm. The construction site is closed Saturdays, Sundays and public holidays (unless special permission is granted by the NCC).

The Contractor must maintain good working equipment and heavy machinery (silencers, regular maintenance, etc), to keep the noise level as low as possible.

Noise filtering equipment, if available, must be used (for example: close the side panels of compressors etc).

The Contractor must shut off any powered equipment when not in use on site.

9. AIR QUALITY

The Contractor must use equipment with functioning exhaust systems.

All machinery must be stopped when not in use.

Soil excavation should be carried out so that it produces the least dust possible.

Construction related-activities have the potential to release airborne particles, should be avoided during periods of prolonged drought and high winds.

The Contractor will take steps to limit the release of dust particles into the air. However, only water is permitted as a stabilizing product within a protected area of 30 m measured horizontally, from a stream, wetland and a source of drinking water.

10. ARCHEOLOGY

The Contractor must cease work immediately upon the discovery of archaeological remains. The site must then be examined by a qualified archaeologist. The Contractor

[3] Turbidity curtain = geotextile membrane kept vertically using a sleeve comprised of a flotation device on its superior edge. The bottom portion of the curtain must rest on the bottom of the creek using a heavy steel chain.

must notify the region office of the Outaouais Ministry of Culture, Communications and the Status of Women (819-772-3992) and also the archaeologist (Heritage Program) at the NCC (613-239-5751).

The Contractor must cease work immediately upon the discovery of human remains. The Contractor must notify the Senior Capital Planner (613-239-5462).

11. SAFETY

Prior to starting work, the Contractor must mark the location of all underground utility lines.

During the construction period, traffic signs should be put in place where required and the Contractor must clearly identify areas of work.

Heavy machinery must have reverse (back-up) alarms.

The Contractor must inform his employees of procedures in case of an accident.

Any complaints related to culvert replacements should be directed to the NCC, who will coordinate public relations.

12. RESTORATION

14.1 Vegetation

The restoration of vegetation must be performed as early as possible, at a proper time for the re-growth of the vegetation.

The Contractor shall replace the herbaceous plants and shrubs cut or damaged by construction. To do this he must:

- Cover the disturbed soil with clean topsoil (from off-site) ;
- Cover topsoil with roll-on turf. This turf must be installed without overlap or gaps, and be pinned to the ground where slopes exceed 30%;
- Shrubs replaced must be endemic to the area and non-invasive. The Contractor shall produce a planting plan. This plan must be approved by the NCC prior to re-planting. The plan must show shrubs species used, location of the plants and the distance between them.

The Contractor must replace trees with a diameter of 10 cm or more at breast height that were cut or damaged during construction. These trees must be replaced with tree species native to the Park area at a ratio of 2:1 or 2 trees planted per 1 tree lost or damaged. The Contractor shall produce a planting plan to address tree replacement. This plan must be approved by the NCC prior to planting. The plan must show tree species used and diameter, location of the trees and the distance between each specimen.

In the case where it is too late in the growing season to restore the vegetation, the Contactor will stabilize the disturbed soil with an erosion control mat to limit the amount of fine material intake to streams. The mat should be dismantled only at the restoration stage.

Warranty Period

The Contractor will offer a two year warranty on roll-on turf, shrubs and trees.

All vegetation in poor condition the following year must be replaced at the expense of the Contractor. It is the same after the second year.

14.3 Ditches

Ditches which damaged by machinery during construction must be reinstated to their original state (slope, width, etc.).

13. PENALTIES

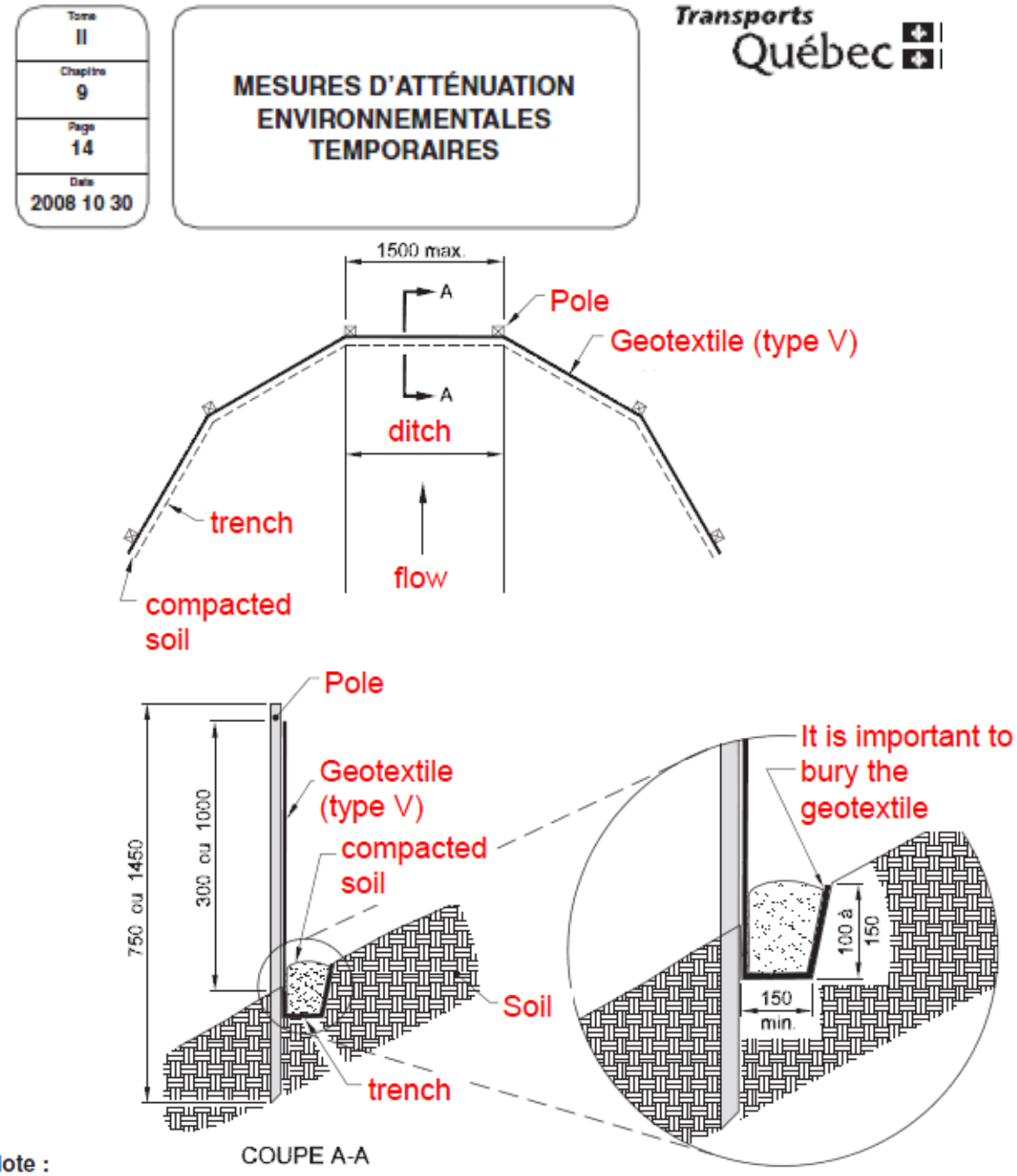
The failure to comply with any provision in this quote may result in a fine up to $2000, payable per violation.

Any violation not corrected by the subsequent day is liable for an additional penalty of the same amount, and this will continue until the correction is made.

Additionally, any expense related to environmental damage is incurred at the expense of the Contractor. In the case of non-performance by the Contractor, the NCC makes the correction and is paid by the Contractor the cost of such work and delays through the withholding of payments.

APPENDICES

APPENDIX 1 STANDARD DRAWING II-9-14 SHOWING A SILT FENCE WITH A GEOTEXTILE

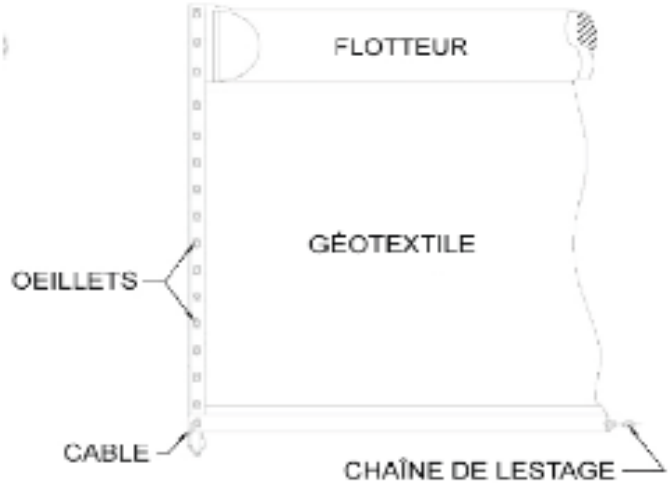


Note :

– All measurements are in mm.

Figure 9.4–2
Silt fence with a geotextile

APPENDIX 2 DIAGRAM SHOWING THE COMPONENTS OF A TURBIDITY CURTAIN AND ITS INSTALLATION WITHIN A STREAM



Source : Web site of Solmax Texel

FIGURE 1
Turbidity curtain design.

Source : Web site of Solmax Texel

FIGURE 2
An exemple of a turbidity curtain installed in a river.

APPENDIX 3 STANDARD DRAWING II-9-18 SHOWING A SETTLING POND

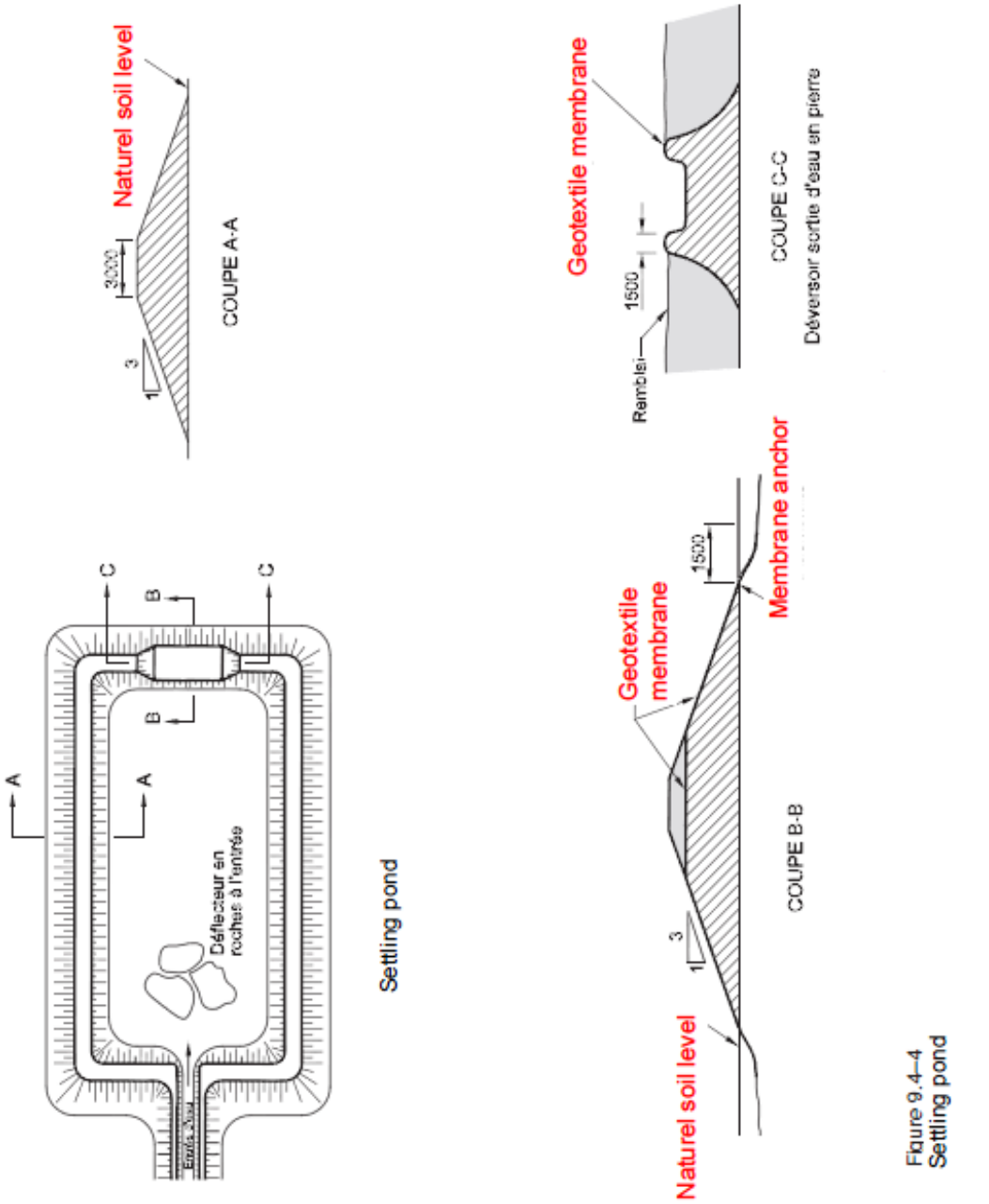


Figure 9.4–4
Settling pond

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MESURES D'ATTÉNUATION ENVIRONNEMENTALES TEMPORAIRES

Transports Québec

PART I – GENERAL

1.1 Reference

.1 Government of Canada
  .1 NBC Part 8
  .2 Canada Labour Code, Canada Occupational Safety and Health Regulations

.2 Province of Quebec
  .1 An Act Respecting Occupational Health and Safety, R.S.Q. 1997
  .2 Safety Code for the Construction Industry 1997

.3 Canadian Standards Association (CSA)
  .1 CSA S350-M1980, Code of Practice for Safety in Demolition of Structures

1.2 Submittals

.1 Health and Safety Plan
  .1 Submit site-specific plan within seven (7) days after date of Notice to Proceed and prior to commencement of Work.
  .2 Engineer will review Plan and provide comments to Contractor within seven (7) days after receipt of plan.
  .3 Revise Plan as appropriate and resubmit to Engineer within seven (7) days after receipt of comments from Engineer.
  .4 Submit two (2) copies of Contractor health and safety inspection reports at least once every two (2) weeks.
  .5 Engineer's review of Plan or inspection reports does not provide an approval and does not diminish Contractor responsibility for health and safety.

.2 Submit immediately upon receipt or completion:
  .1 construction safety checklists,
  .2 reports or directions issued by health and safety inspectors,
  .3 incident and accident reports,
  .4 Material Safety Data Sheets (MSDS), and
  .5 health and safety training records including names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.

.3 Certification of medical surveillance for site personnel
  .1 Where prescribed by legislation, regulation or safety program, submit Certification within seven (7) days

after date of Notice to Proceed and prior to site mobilization.

.2 Update and submit Certification as personnel are sent to site.

.4 On-site Contingency and Emergency Response Plan: Address standard operating procedures to be implemented during emergency situations.

1.3 General requirements

.1 None.

.2 Health and Safety Plan

.1 Perform site-specific hazard assessment.

.2 Attend health and safety pre-construction meeting.

.3 Develop written site-specific Plan based on hazard assessment prior to commencing any site Work.

.4 Include in Plan safety and health risk or hazard analysis for site tasks and operations.

.5 Plan must address project specifications.

.6 File required health and safety notices with Provincial authorities prior to commencement of Work.

.7 Continue to implement, maintain, and enforce Plan until final demobilization from site.

.3 Responsibility

1 Be responsible for safety of persons and property on site and for protection of persons off site and environment to extent that they may be affected by conduct of Work.

2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.4 Compliance requirements

1 Applicable legislation, regulations

.1 NBC Part 8, WHMIS, FC 301, FC 302

.2 Canada Labour Code, Canada Occupational Safety and Health Regulations

.3 For work in Québec: Occupational Health and Safety Act, Industrial and Commercial Establishments Regulation, R.R.Q.

.4 Specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.

.2 Document postings and availability

.1 Comply with provincial general posting requirements and other safety-related postings as the Engineer may direct.
.2 Maintain one copy of each applicable health and safety standard at job site.

5 Designated substances, volatile compounds, unforeseen hazards
.1 Notify Engineer 48 hours in advance of work in occupied areas involving designated substances (under applicable provincial legislation), hazardous substances (Canada Labour Code Part II Section 10), and before works or using volatile compounds.
.2 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work immediately and advise Engineer verbally and in writing.

1.4 Health and safety coordinator

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator must:
.1 have minimum two (2) years' site-related working experience specific to activities associated with the work.
.2 have basic working knowledge of specified occupational safety and health regulations,
.3 be responsible for completing health and safety training session and ensuring that personnel not successfully completing the required training are not permitted to enter site to perform Work,
.4 be responsible for implementing, enforcing daily and monitoring site-specific Health and Safety Plan, and
.5 be on site during execution of Work.

1.5 Construction safety Checklist

.1 Obtain Construction Safety checklist from Engineer.

.2 Review and implement applicable health and safety checklists provided by Engineer in collaboration with Engineer.

1.6 Correction of non-compliance

.1 Immediately address health and safety non-compliance issues identified by Engineer.

.2 Provide Engineer with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Engineer may stop Work if non-compliance of health and safety regulations is not corrected.

1.7 Blasting and power activated Fasteners

.1 Blasting
- .1 Blasting or other use of explosives is not permitted only after receipt of written instruction by Engineer.
- .2 Blasting operations: to CSA S350.

.2 Power-activated fasteners
- .1 Use power actuated devices only after receipt written permission from Engineer.

1.8 Work stoppage

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

.2 Assign responsibility and obligation to Health and Safety Coordinator to stop or start Work when, at Health and Safety Coordinator's discretion, it is necessary or advisable for reasons of health or safety. Engineer may also stop Work for health and safety considerations.

PART 2 – PRODUCTS

NOT APPLICABLE

PART 3 – IMPLEMENTATION

NOT APPLICABLE

END OF SECTION