PUBLIC SERVICES AND PROCUREMENT CANADA
Client service team - Heritage
Québec region

The National Battlefields Commission

GILMOUR HILL ROADSIDE CORRECTIVE MEASURES – PHASE 2 QUÉBEC CITY, QUÉBEC

Ref. No : R.113241.001

FOR TENDER
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Part 1 General

1.1 DEFINITIONS

.1 The following terms used in the various sections of the specifications have the meanings given to them in the following definitions:

.1 Department: Public Services and Procurement Canada (PSPC)

.2 Departmental Representative: Any person designated by Public Works and Government Services Canada to act on its behalf. This may be an employee of SPAC, the testing laboratory representative, a consultant, an employee of the NBC, etc.

.3 Contractor: Any person, firm, or corporation who contracts with the Department for the performance of work on the project, and who is licensed in accordance with the Province of Quebec's Act Respecting the Professional Qualifications of Contractors in Construction. The Contractor is delegated control under the Occupational Health and Safety Act (OHSA) and shall act as such before the Commission de la santé et de la sécurité du travail (CSST) and fulfill the obligations of such control.

.4 Project Documents or Plans and Specifications: All tender documents including the specifications, engineering plans and drawings listed in the attached index as well as any subsequent drawings submitted for the same work.

1.2 INTERPRETATIONS

.1 Words, phrases and abbreviations having a known technical or professional meaning shall be understood as such in these specifications and drawings.

.2 Dimensions shown on drawings or scaled or represented by modulus or lines, arrows or otherwise, shall take precedence over the drawings.

.3 Plans or drawings to scale shall take precedence. Similarly, the applicable Specifications and Drawings shall always be the most recent versions.

.4 Where there is a discrepancy between the numerical dimensions shown on the drawings, the departmental representative shall be referred to for the applicable dimensions. No measurements taken to scale on the drawings will be considered for interpretation.

.5 All inconsistencies between the specifications and drawings shall be submitted in writing to the Departmental Representative for a final written decision.

.6 Specifications and drawings are complementary, so that what is required by one is also required by the other. The Work to be constructed in accordance with the Specifications and Drawings shall be complete in its essential parts, that is, it shall include all items normally required by the Specifications and Drawings, even though not all such items are

specifically mentioned. The Contractor shall not take advantage, to the detriment of the NBC, of any obviously unintentional errors or omissions that he may discover.

.7 Where the totality of the work or materials is not specifically stated, the trade concerned shall provide the best quality.

.8 The Departmental Representative may, for clarification purposes only, provide the Contractor with additional drawings to ensure proper execution of the Work. Such drawings shall have the same meaning and scope as if they were included with the plans referred to in the contract documents.

1.3 WORK RELATED INFORMATIONS

1. The required work is located on Gilmour Hill, connecting Champlain Boulevard and Georges Avenue V1, in Quebec City. This hill is under the responsibility of the National Battlefields Commission. The corrective work is aimed at the roadway structure, whose shoulder, over approximately 40 meters, is non-existent. The addition of a berlin wall to stop the deterioration of the pavement structure is therefore necessary. The new berlin wall will be approximately 1.4m from the existing curb and anchored in the sound rock in the area.

.2 The work under this contract includes but is not limited to:

- .1 Mobilize within the area indicated on the plans.
- .2 Maintain traffic flow as directed on the plans.
- .3 Arrange for no damage to the pavement, the pavement structure of the hill, and protect and support existing structures (street lights, curbs and trees).
- .4 Excavate and pile up the existing material in the NBC disposal site, upstream of Gilmour Hill.
- .5 Install a geotextile membrane and sediment barriers on the excavated walls to avoid erosion and loss of material in the embankment.
- .6 Install the berlin wall according to the information provided on the plans and validate that the profile is in compliance.
- .7 Provide and drill HSS columns into bedrock.
- .8 Provide and weld L-shaped angles and stiffeners to HSS.
- .9 Supply and install wood pieces between HSS.
- .10 Paint HSS, angles, stiffeners and welds and touch up as required
- .11 Fill HSS with granular material and weld top of HSS to prevent water accumulation.
- .12 Replace excavated material in front of berlin wall to restore existing profile.
- .13 Provide and place fill material between the berlin wall and the existing curb.
- .14 Provide and place seed
- .15 Provide and place new cold paving in holes and cracks in the pavement in the work area.
- .16 Clean pavement and mobilization area.
- .17 Provide method of maintaining and holding streetlight in place during the course of the work.
- .18 Resurface the street light at the completion of the work.

.19 Restore all areas where the Contractor has worked/circulated to pre-Work condition.

.20 Demonstrate that the piles have reached the desired depth as per the contract documents and provide a letter certifying this.

.21 Perform final video survey in digital format.

.22 Any other related tasks required by the specifications or plans.

1.4 FEES, PERMITS AND CERTIFICATES

.1 The contractor shall be required to obtain all permits necessary for the performance of the Work. The contractor shall comply with all federal, provincial or municipal regulations and any other laws or regulations pertaining to this work. The Contractor shall be responsible for any contravention of such laws and regulations.

.2 The Contractor shall assume (at his own expense) all obligations relating to safety measures required by the Quebec Occupational Health and Safety Act and all costs arising from such obligations.

.3 Provide inspection certificates demonstrating that the Work complies with the requirements of the authorities having jurisdiction.

.4 Submit to the Departmental Representative a copy of applications to the above authorities and approval documents received.

1.5 PROTECTION OF EXISTING STRUCTURES

.1 Special care shall be taken by the contractor to avoid damage to existing structures and access.

.2 The contractor is solely responsible for damages caused to existing infrastructures and shall restore them according to the requirements of the Departmental Representative and in compliance with the most recent standards in force. All costs inherent to the hiring of experts, if necessary, and to the restoration of any deteriorated element, are at the contractor's expense.

1.6 CONTRACTOR USE OF SITE

.1 Restrict use to areas determined by the Departmental Representative for the execution of the work and storage. Specifically, the Contractor shall mobilize his equipment, storage areas and site trailer to the location specified on the plans.

.2 Entry of materials, equipment and workers shall not be at the expense of site operations.

.3 **The hill may be closed consecutively for a maximum of 7 calendar days. If the contractor performs work on the weekend, the contractor will be responsible for the costs associated with the work. In addition, the contractor will be required to comply with municipal regulations regarding noisy work.**

.4 **Except for the possible complete closure of the shoreline, the hill will be in operation for the duration of the work as detailed on the plans.**

.5 Do not unduly accumulate materials, equipment or materials in storage or in piles so as to avoid cluttering the site. Remove materials, equipment or materials that interfere with the work of the Departmental Representative or other contractor.

.6 Throughout the duration of the work, do not use the site for lodging or temporary residence of the contractor's employees.

.7 After obtaining the necessary approvals, pay for the use of additional storage areas or work necessary to complete the work.

1.7 REMOVED MATERIALS AND EQUIPMENT

.1 Unless otherwise specified, materials and equipment to be removed become the property of the Contractor and shall be removed and removed from the site as soon as possible in accordance with applicable regulations.

1.8 COSTS BREAKDOWN

.1 At the request of the Departmental Representative, submit a detailed cost breakdown for the contract, also indicating the overall contract price, as directed by the Departmental Representative. Once approved by the Departmental Representative, the cost breakdown will be used as the basis for calculating progress payments.

1.9 REQUIRED DOCUMENTS

.1 Keep one copy of each of the following documents on site.

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Revised Shop Drawings.
- .5 List of unreviewed Shop Drawings.
- .6 Change Orders.
- .7 Other contract changes.
- .8 Field Test Reports.
- .9 Copy of approved schedule.
- .10 Health and Safety Plan and other safety related documents.
- .11 Other documents as indicated.

1.10 SITE SURVEY

.1 In order to become familiar with the conditions of the project and to obtain all information necessary for the proper execution of the contract, examine the site of the work. Ignorance of site conditions shall not, under any circumstances, constitute a valid reason for claiming additional payment.

1.11 WORK SCHEDULE

.1 The Contractor shall proceed diligently and begin preparation of the Work as soon as the contract is issued by the Department.

.2 The Contractor shall have six (6) weeks to complete the Work from the time of contract award.

.3 For on-site work, commence work with the approval of the Departmental Representative in writing only.

.4 The bidder to whom the Department proposes to award the contract shall, within a period of time deemed reasonable by the Departmental Representative, submit a schedule showing the various stages of progress of the Work and the expected completion date.

.5 Based on the schedule of work and in a form acceptable to the Departmental Representative, provide within five (5) working days of contract award, dates for submission of shop drawings, material lists and samples.

.6 Revisions to the progress of the work, based on the submitted schedule, will occur at the discretion of the Departmental Representative. The schedule will be updated weekly by the contractor with the cooperation and approval of the Departmental Representative.

1.12 NATIONAL BATTLEFIELDS OF QUEBEC ACT

.1 For all work to be performed within the limits of the National Battlefields Commission's property, the Contractor shall perform such work in accordance with the provisions of the National Battlefields Act of Quebec.

1.13 REFERENCES AND STANDARDS

.1 All Work conforms to the requirements of the contract documents and the applicable requirements of the most recent edition of the Canadian Government Specifications Board (CGSB), Canadian Standards Association (CSA), National Building Code of Canada (NBCC), American Society for Testing and Materials (ASTM), Bureau de normalisation du Québec (BNQ), General Specifications and Specifications (GSD) and other standards and codes specified herein.

1.14 QUALITY CONTROL ON SITE

.1 The work shall be performed by qualified certified workers or apprentices as defined in the Territorial Law on Vocational Training and Qualification of the Workforce.

1.15 TESTING SERVICES

.1 **Unless otherwise specified, the Contractor will designate and pay for the laboratory to perform the inspections and testing.**

.2 Provide safe work areas, support, materials, equipment, services and coordination for testing as required by the testing agency.

.3 Where test results indicate that the Work does not conform to the specifications, the Contractor shall pay for additional testing to verify that the corrective action taken on the Work is acceptable.

1.16 INSPECTIONS AND TESTS

.1 Demonstrate that the piles drilled into the rock have reached the desired depth as indicated in the contract documents. Contractor shall provide a letter certifying this.

.2 Unless otherwise specified, testing of materials, equipment and apparatus specified in the various sections is the responsibility of the Contractor.

.3 Provide instruments, materials and qualified personnel necessary to perform the tests.

.4 Upon completion of testing, submit two (2) sets of properly documented test reports to the Departmental Representative.

.5 Non-prescribed tests may be performed at the request of the Departmental Representative. The cost of such tests will be borne by the Departmental Representative.

.6 Where tests or inspections show that the Work does not conform to the requirements of the Contract, the Contractor shall be responsible for the cost of the initial tests and the cost of any additional tests required by the Departmental Representative to verify that the corrections to the Work are acceptable.

.7 Pay the cost of work performed to expose and restore the Work that was covered prior to the required inspections or tests being performed and approved by the Department Representative.

1.17 SIGNALISATION

.1 Provide known signage, including traffic, information, instruction, use of materials and public safety, as directed by the Departmental Representative, or use graphic symbols approved by the Departmental Representative.

.2 Reference works to be considered:

- .1 Quebec Highway Safety Code, latest edition
- .2 Safety Code for Construction Work, latest edition
- .3 Volume I - Road Design of the Standards - Road Works series of the Ministry des Transports, latest edition - Volume I hereafter;
- .4 Volume II - Road Construction of the Department of Transportation Standards - Road Construction series, latest edition - Volume II hereafter;
- .5 Volume III - Engineering structures of the Standards - Roadworks series of the Ministry of Transport, latest edition - Volume III hereafter;
- .6 Volume V - Road Signs and Signals, volumes 1, 2 and 3, of the Standards - Road Works series of the Ministry of Transport, latest edition - Volume V below;
- .7 Volume VII - Materials of the Standards - Road Works series of the Ministry of Transport, latest edition - Volume VII below;
- .8 Volume VIII - Restraint Systems of the Department of Transportation Standards - Road Structures Series - Volume VIII hereafter;
- .9 Roadwork Site Safety Action Plans (2014-2017 Edition).

.3 The maintenance and traffic plan shall take into consideration the partial closure of the uphill lane of the hill, both upstream and downstream of the work, to allow for mobilization of the contractor's work area.

.4 Contractor shall close the uphill side of the hill between the hours of 2:00 p.m. and 6:30 a.m. daily for the duration of the work. Provide signage accordingly to comply with all applicable standards and regulations.

.5 Contractor to close downhill between 6:30 am and 2:00 pm daily throughout the construction period. Provide signage accordingly to comply with applicable standards and regulations.

.6 The maintenance and traffic plan shall be signed and sealed by an engineer member of the OIQ and shall conform to the standards for road works, Volume V - road signs.

.7 Signage shall be present on the following streets:

.1 Grande Allée Est
.2 Grande Allée Ouest
.3 Avenue de Laune
.4 Boulevard Champlain Est
.1 Boulevard Champlain Ouest

.8 **No advertising is permitted on the work site.**

.9 The contractor shall install a gate and site fencing to delineate the work area.

.10 The gate shall be kept closed at all times, except in the event of a traffic incident.

1.18 IMPLEMENTATION OF THE WORK

.1 From the control lines and levels shown on the plans, the Contractor shall establish the major benchmarks required for the work and provide all necessary equipment.

.2 take necessary steps to ensure that benchmarks are not displaced during the course of the work.

.3 Provide all necessary equipment to allow the Departmental Representative to perform any verifications deemed necessary.

.4 Prior to commencing the Work, the Contractor shall verify all field measurements and notify the Departmental Representative of any errors or discrepancies.

.5 During the course of the work, if any non-conformities are found as a result of staking errors made by the Contractor, the Contractor shall re-stake the non-conforming work at his own expense.

.6 Piles shall be installed and maintained in place with the following tolerances:

.1 the deviation of the axis of a pile from its theoretical position shall be less than 2% of its length;

.2 the deviation of the final position of the head of a pile from its theoretical position shall not exceed 100mm.

1.19 CLEANING

.1 Clean up the work area as the work progresses. At the end of each work period and more often if requested by the Departmental Representative, clear the work area of waste materials, stack materials and equipment for reuse and perform a general clean-up of the area.

.2 Upon completion of work, remove scaffolding, temporary protection and excess materials/materials. Repair all damage observed at this stage.

.3 Clean areas affected by the contracted work to at least pre-construction condition to the satisfaction of the Departmental Representative.

1.20 EXCESS MATERIALS

.1 It is the contractor's responsibility to transport and dispose of all off-site waste material from the work at the contractor's expense to a site approved by the appropriate authorities.

.2 The contractor is solely responsible for the consequences (damages, claims, etc.) related to the disposal of waste materials and any claims that may arise. The Owner is not responsible for the disposal of waste materials.

1.21 ERRORS AND OMISSIONS

.1 If the contractor, in the performance of his work, finds any discrepancies between the plans and the physical conditions of the site or any errors or omissions on the plans, he shall immediately notify the Departmental Representative in writing, failing which the contractor shall proceed at his own risk until he has received authorization from the Departmental Representative

1.22 CLIMATIC CONDITIONS

.1 The Contractor shall not claim any additional amount for adverse weather conditions including winter work. He shall plan his work according to the conditions likely to be encountered at the time of execution and include in his bid the amounts that may be necessary for the resumption of deficient work caused by weather conditions, etc.

1.23 WORKING HOURS

.1 The work schedule is from 7:00 am to 5:00 pm.

.2 If desired, the Contractor may perform work on weekends by making a request to the Departmental Representative at least 48 hours in advance.

.3 No additional charges will be accepted for work performed on weekends.

1.24 VIDEO AND PHOTO RECORDING

.1 Prior to commencing the Work, the Contractor shall digitally videotape, in the presence of the Departmental Representative, the areas where the Work is to be performed, in order to

capture on film, the conditions existing prior to the commencement of the Work (condition of pavement, buildings, walls and walls, landscaping, trees, etc.), and to restore the Work to its original conditions upon completion.

.2 A copy of the video (USB) shall be provided to the Department Representative.

.3 All existing work affected or damaged during the performance of the Work by temporary facilities, machinery, equipment, materials, workers, subcontractors, etc., shall be repaired at the Contractor's expense and to the satisfaction of the Departmental Representative without delay in the delivery of the Work.

.4 The Contractor shall provide a photographic record of the progress of the Work. This shall be in the form of a daily site survey, including photographs. Photos shall be in .JPEG format with a minimum photo density of 330 dpi.

1.25 SITE MEETING

.1 Site meetings will be held on a bi-weekly basis, beginning one week after contract award. The frequency may be adjusted as the work progresses.

.2 The contractor shall submit documentation for mobilization prior to the first meeting.

Partie 2 Products

2.1 NOT APPLICABLE

.1 Not applicable

Partie 3 Execution

3.1 NOT APPLICABLE

.1 Not application

END OF SECTION

Part 1 General information

1.1 STATEMENT OF AMOUNTS DUE

.1 The statement of account shall be prepared in accordance with such supporting documentation as the Department's representative may reasonably require. Once approved by the Departmental Representative, the statement of account may form the basis for payment requests.

.2 Attach a statement based on the settlement of amounts due to each payment request.

.3 Claims for commodities that have been delivered to the site of the Work, but have not yet been incorporated into the Work, shall be supported by such evidence as the Department's representative may reasonably request to establish the value of the commodities and to certify their delivery.

1.2 FIXED OR UNIT PRICES

.1 The total contract amount is broken down into a description of work paid for on a lump sum basis (lump sum table) and on a unit basis (unit table).

.2 Each of the lump sum or unit price breakdowns shall include all expenses, work, disbursements, payments, direct or indirect costs, mobilizations, demobilizations and acts, all facts, and all liabilities, obligations, omissions and errors of the Contractor in connection with the performance of this work. These prices shall also include transportation and installation of materials, as well as all general business expenses: administration, insurance, dues, interest, rent, taxes and other incidental expenses. It shall include losses and damages which may result from the nature of the work, fluctuations in prices and wages, business risks, strikes, delays not attributable to the Department's Representative, transportation restrictions, accidents and the action of the elements of nature.

1.3 SUBMISSION FORM

.1 **Item 1** - Site organization, excavation and backfill, berliner wall : This item is a global, lump-sum item, it includes the organization of the work site, mobilization, demobilization, environmental protection and restoration of the site to its original state, protection of existing structures, purchase, depreciation or rental costs of machinery, tools and equipment, personnel, materials, site facilities and any additional mobilization that may be required to meet the work schedule, installation of rock anchors to ensure worker safety and all requirements described in Division 01 (General Requirements) of these specifications. This item also includes the cost of labor and all other work not included in other items of the schedule. This item also includes the excavation of the natural ground, the friable rock, the piling of the natural ground for reuse, the supply and placement of the backfill materials, the supply and placement of the soil retaining membrane, the supply and placement of the hydroseeding, the mats, the supply and placement of the cold laid asphalt mix as well as any other incidental expense. It also includes the installation of the piles by a surveyor

according to the indications given on the plan. It also includes the supply, drilling and installation of HSS piles in the rock. It also includes the supply and installation of angle and stiffeners to be welded on the HSS. It also includes the supply and installation of the wooden members as well as all accessories and any incidental expenses.

.2 **Item 2 -** Optional Pile Section: This item is a unit item, payable per 1.2m (4 ft) of vertical section. It includes the supply, installation, welding to the section on which it is installed, welding of the angles to hold the wood pieces, and painting of the optional section, angles, stiffeners and welds and any incidental expenses.

1.4 SUBSTANTIAL COMPLETION OF THE WORK

.1 When the Work is substantially complete, prepare and submit to the Department Representative a complete list of items that need to be completed or corrected, and request that the Department Representative conduct a walk-through of the Work to establish substantial completion of the Work. The omission of an item from the list does not affect the Contractor's obligation to perform the entire contract.

.2 No later than five (5) days after receipt of the list and application, the Department's representative will conduct a walk-through of the Work to verify the adequacy of the application and, no later than five (5) days after the walk-through, will notify the Contractor of its decision as to whether the Work or the designated portion of the Work is substantially complete.

.3 The Department's representative will issue a certificate indicating the date of substantial completion of the work or designated portion of the work.

.4 Immediately following the issuance of the Certificate of Substantial Completion, establish, in consultation with the Department's representative, a reasonable date for final completion of the work.

1.5 PAYMENT OF RETAINAGE UPON SUBSTANTIAL COMPLETION OF THE WORK

.1 After the Certificate of Substantial Performance is issued, proceed as follows

.1 Submit a request for payment of the withholding.

.2 Provide an affidavit stating that, except for amounts properly withheld or specific amounts in dispute, all accounts for labor, subcontracts, products, machinery and construction equipment, and any other indebtedness incurred to achieve substantial completion of the Work for which the Owner may be held liable, have been paid in full.

.2 Upon receipt of the request for payment and affidavit, the department representative will issue a withholding payment certificate.

1.6 FINAL PAYMENT

.1 The Contractor shall submit a request for final payment when the Contractor believes the work has been completed.

.2 No later than five (5) days after receipt of a request for final payment, the Department's representative will conduct a walk-through of the work to verify the merits of the request. Within five (5) days of the visit, the Department's representative will notify the Contractor whether the claim has been accepted or denied and, if denied, will provide the reasons for the denial.

.3 If the Department Representative finds that the Contractor's request for final payment is justified, the Department Representative will issue a Certificate of Final Payment.

Part 2 Product

2.1 NO OBJECT

.1 Not applicable.

Part 3 Execution

3.1 NO OBJECT

.1 Not applicable.

END OF THE SECTION

Part 1 General

1.1 ADMINISTRATIVE PROCEDURES

.1 As soon as possible and in a predetermined sequence so as not to delay the work, submit the required documents and samples to the Departmental Representative for approval. Delay in submission shall not constitute sufficient reason for an extension of time to complete the work and no such request will be granted.

.2 Do not proceed with any work that requires the submission of documents and samples until the verification of all submitted materials is fully completed.

.3 Specifications shown on shop drawings, data sheets, and samples of products and structures shall be expressed in metric units.

.4 Where items are not produced or manufactured in metric units or where characteristics are not given in SI units, converted values may be accepted.

.5 Review the documents and samples prior to submission to the Department Representative. By this pre-verification, the Contractor confirms that the requirements applicable to the work have been or will be determined and verified, and that each of the documents and samples submitted have been reviewed and found to be in compliance with the requirements of the work and the contract documents. Documents and samples that are not stamped, signed, dated, and identified in connection with the particular project will be returned without review and will be considered rejected.

.6 Notify the Department Representative in writing at the time of submission of documents and samples of any deviations from -the requirements of the contract documents and state the reasons for such deviations.

.7 Ensure accuracy of field measurements relative to adjacent structures affected by the work.

.8 The fact that submitted documents and samples are reviewed by the Department Representative does not relieve the Contractor of its responsibility to submit complete and accurate documents.

.9 The fact that the submitted documents and samples are reviewed by the Department Representative does not relieve the Contractor of its responsibility to submit documents in accordance with the requirements of the Contract Documents.

.10 Keep a verified copy of each submitted document on site.

1.2 SHOP DRAWINGS AND DATA SHEETS

.1 The term "shop drawings" means drawings, schematics, illustrations, charts, performance or performance graphs, pamphlets, and other documentation required to be provided by the Contractor to show in detail any portion of the subject work.

.2 The shop drawings shall indicate the materials to be used and the methods of construction, fastening or anchoring to be employed, and shall contain erection diagrams, details of connections, pertinent explanatory notes and any other information necessary for the performance of the work. Where structures or components are connected or joined to other structures or components, indicate on the drawings that the requirements are coordinated, regardless of the section under which the adjacent structures or components are to be supplied and installed. Make reference to the specifications and preliminary design drawings.

.3 Allow five (5) working days for the Department Representative to review each batch of materials submitted.

.4 Changes in the shop drawings by the Department Representative are not intended to vary the contract price. If they do, however, notify the Department Representative in writing before proceeding with the work.

.5 Make changes to the shop drawings as requested by the Departmental Representative in accordance with the requirements of the contract documents. At the time of resubmittal of the drawings, notify the Departmental Representative in writing of any changes that have been made in excess of those required.

.6 Submitted materials must be accompanied by a letter of transmittal, in duplicate, containing the following information:

- .1 the date;
- .2 the project name and number;
- .3 the name and address of the Contractor;
- .4 the designation of each drawing, data sheet and sample and the number submitted;
- .5 any other relevant data.

.7 Submitted materials must bear or indicate the following:

- .1 date of preparation and review dates;
- .2 the project name and number;
- .3 the name and address of the following persons:
  - .1 the subcontractor-;
  - .2 the supplier;
  - .3 the manufacturer;
- .4 Contractor's stamp, signed by the Contractor's authorized representative, certifying that the submitted documents are approved, that the field measurements have been verified, and that the package complies with the requirements of the Contract Documents;
- .5 the relevant details for the portions of the work involved:
  - .1 materials and manufacturing details;
  - .2 layout or configuration, with dimensions, including those taken on site, and clearances
  - .3 details of assembly or adjustment;

.4 characteristics such as power, flow rate or capacity;

.5 performance characteristics;

.6 reference standards;

.7 the operational mass;

.8 wiring diagrams;

.9 single line diagrams and schematic diagrams;

.10 links with adjacent structures.

.8 Distribute copies of the shop drawings and data sheets once the Department Representative has completed the review.

.9 Submit three (3) hard copies or one electronic copy of the shop drawings prescribed in the technical sections of the specifications and as reasonably required by the Department Representative.

.10 If no shop drawings are required due to the use of a standard manufactured product, submit three (3) printed copies or an electronic copy of the manufacturer's data sheets or documentation prescribed in the technical sections of the specification and required by the Department Representative.

.11 Submit three (3) hard copies or one electronic copy of the test reports prescribed in the technical sections of the specifications and required by the Department Representative.

.1 The report signed by the official representative of the testing laboratory shall certify that materials, products or systems identical to those proposed in the work have been tested in accordance with the prescribed requirements.

.2 Testing must have been completed within three (3) years prior to the date of contract award.

.12 Submit three (3) hard copies or one electronic copy of the certificates prescribed in the technical sections of the specifications and required by the Department Representative.

.1 The documents, printed on the manufacturer's official correspondence paper and signed by a representative of the manufacturer, shall certify that the products, materials, equipment, and systems furnished conform to the specifications.

.2 Certificates must be dated after contract award and indicate the project designation.

.13 Submit three (3) hard copies or one electronic copy of the manufacturer's instructions prescribed in the technical sections of the specification and required by the Department Representative.

.1 Pre-printed documents describing the method of installation of products, materials and systems, including special instructions and material safety data sheets indicating impedances, risks and safety measures to be implemented.

.14 Submit three (3) hard copies or one electronic copy of the manufacturer's field inspection reports prescribed in the technical sections of the specifications and required by the Department's representative.

.1 Reports of tests and verifications performed by the manufacturer's representative to confirm compliance of installed products, materials, equipment or systems with the manufacturer's instructions.

.15 Submit three (3) hard copies or one electronic copy of the operation and maintenance records prescribed in the technical sections of the specifications and required by the Department Representative.

.16 Delete information that does not apply to the work.

.17 In addition to the standard information, provide any additional details that apply to the work.

.18 When the shop drawings have been checked by the Department Representative and no errors or omissions have been found or only minor corrections are made, a printout will be returned and the fabrication and installation work can then proceed. If the shop drawings are rejected, the annotated copy(ies) will be returned and the corrected shop drawings will be resubmitted as specified above before fabrication and installation can proceed.

.19 The Department representative's review of the shop drawings is solely to verify that the data shown on the drawings is consistent with the general design.

.1 This review does not imply departmental approval of the detailed design submitted in the shop drawings, which is the responsibility of the submitting Contractor, nor does it relieve the Contractor of the obligation to submit complete and accurate shop drawings and to comply with all requirements of the Work and Contract Documents.

.2 Without limiting the generality of the foregoing, it is important to note that the Contractor is responsible for the accuracy of the confirmed field dimensions, the provision of information on shaping methods or construction and installation techniques, and the coordination of the work performed by all trades.

1.3 PRODUCT SAMPLES

.1 Submit two (2) product samples for review as specified in the technical sections of the specifications. Label the samples indicating their origin and intended destination.

.2 Ship samples postage paid to the Department Representative's business office.

.3 Notify the Department Representative in writing at the time of submission of product samples of deviations from the requirements of the contract documents.

.4 When color, pattern or texture is specified, submit the full range of samples required.

.5 Changes in samples made by the Department Representative are not intended to vary the contract price. If they do, however, notify the Department Representative in writing prior to commencing work.

.6 Make such modifications to samples as may be requested by the Department Representative while complying with the requirements of the contract documents.

.7 The reviewed and approved samples will become the standard against which the quality of materials and workmanship of the finished and installed work will be evaluated.

1.4 SAMPLES OF THE WORK

.1 Perform required samples of the Work in accordance with Section 01 45 00 -Quality Control.

1.5 CERTIFICATES AND REPORTS

.1 Submit documents required by the Occupational Health and Safety Commission immediately after contract award.

.2 Submit copies of insurance policies immediately after contract award.

Part 2 Products

2.1 NO OBJECT

.1 Not applicable.

Part 3 Execution

3.1 NO OBJECT

.1 Not applicable.

END OF THE SECTION

Partie 1 General

GENERAL NOTE: in this section the term “site” includes all the facilities located at the site where the work is taking place (construction site, buildings, access, infrastructure, parkings, bays, etc.).

1.1 REFERENCES

.1 Province of Québec

.1 Loi sur la santé et la sécurité du travail L.R.Q., c. S-2.1 (Act respecting occupational health and safety).

.2 Code de sécurité pour les travaux de construction L.R.Q., c. S-2.1, r.4 (Safety code for the construction industry).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section [01 33 00 - Submittal Procedures].

.2 Submit to Departmental representative, [and the CNESST] the site-specific prevention program, as outlined in the article “GENERAL REQUIREMENTS”, at least 10 days prior to the start of work.

.3 Departmental representative will review Contractor’s site-specific prevention program and provide comments to Contractor within 10 days after receipt of the document. Revise plan as appropriate and resubmit to Departmental representative within 5 days after receipt of comments from Departmental representative. Departmental representative reserves the right not to authorize the start of work on the construction site as long as the content of the prevention program is not satisfactory. The Contactor shall then update his prevention program and resubmit it to the Departmental representative if the scope of work changes or if the working methods of the Contractor differ from his initial plans or for any other applicable new condition.

.4 Departmental representative’s review of Contractor’s site-specific prevention program should not be construed as approval of the program and does not reduce the Contractor’s overall responsibility for construction Health and Safety during the work.

.5 Submit copies of Contractor’s authorized representative’s construction site health and safety inspection reports to Departmental representative, [determine frequency, but at least once a week].

.6 Submit to Departmental representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit to Departmental representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard.The investigation report shall contain at least the following:

1. date, time and place of accident;

2. name of sub-contractor involved in the accident;
3. number of persons involved and condition of wounded;
4. witness identification;
5. detailed description of tasks performed at the time of the accident;
6. equipment being used to accomplish the tasks performed at the time of the accident;
7. corrective measures taken immediately after the accident;
8. causes of the accident;
9. preventive measures that have been put in place to prevent a similar accident.

.8 Submit to Departmental representative WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittals. Contractor must also keep one copy of these documents on the construction site.

.9 Medical Surveillance: where prescribed by legislation, regulation or prevention program, submit certification of medical surveillance for construction site personnel prior to commencement of Work, and submit additional certifications for any new construction site personnel to Departmental representative.

.10 Submit to Departmental representative an on-site Emergency Response Plan at the same time as the prevention program. The Emergency Response plan must contain the elements listed in the article “GENERAL REQUIREMENTS” of this section.

.11 Submit to Departmental representative copies of all training certificates required for the application of the prevention program, in particular (if applicable) for the following:

.1 first aid in the workplace and cardiopulmonary resuscitation;
.2 work likely to release asbestos dust (mandatory for all work where asbestos is present);
.3 work in confined spaces (mandatory for all work in confined spaces);
.4 lockout-tagout procedures (mandatory for all work requiring lockout);
.5 safely operating forklift trucks (mandatory for all forklift usage);
.6 safely operating elevating work platforms (mandatory for the use of all elevating platforms);
.7 any other requirement of Regulations or the safety program.

In addition, the certifications of the *Cours de santé et sécurité générale pour les chantiers de construction* (General Health and Safety Training for Construction Sites) shall be available on demand on the construction site.

.12 Engineer’s plans and certificates of compliance: Contractor must submit to the Departmental representative and to the *Commission des normes, de l’équité, de la santé et de la sécurité du travail* (CNESST) a copy signed and sealed by engineer of all plans and certificates of compliance required pursuant to the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry) or by any other legislation or regulation or by any other clause in the specifications or in the contract. The Contractor must also submit a certificate of conformity signed by an engineer once the

facility for which these plans were prepared has been completed and before a person uses the facility. A copy of these documents must be available on site at all times.

1.3 FILING OF NOTICE OF CONSTRUCTION SITE OPENING

.1 Notice of construction site opening shall be submitted to the CNESST before work begins. A copy of such notice and acknowledgment of receipt from the CNESST shall be submitted to Departmental representative.

At the completion of all the work, a notice of construction site closing shall be submitted to the CNESST, with a copy to Departmental representative.

.2 The Contractor shall assume the role of being the Principal Contractor in the limits of the construction site and elsewhere where he must execute work within the framework of this project. The Contractor shall recognize the responsibility of being the Principal Contractor of the project and identify himself as such in the notice of the construction site opening he provides to the CNESST.

.3 The Contractor shall accept to divide and identify the construction site adequately in order to define time and space at all times throughout the course of the project.

1.4 HAZARD ASSESSMENT

.1 The contractor must perform construction site specific safety hazard assessment related to project.

.2 The Contractor must plan and organize the work in such a way as to promote the elimination at the source of the dangers or collective protection and thus reduce to a minimum the use of personal protective equipment. When personal fall protection is required, workers must use a safety harness in accordance with CAN / CSA-Z-259.10-M90. The seat belt should not be used for fall protection.

.3 Equipment, tools or means of protection which cannot be installed or used without compromising the health and safety of workers or the public is deemed to be inadequate for the work to be performed.

.4 All mechanical equipment must be inspected before delivery to the site. Before using mechanical equipment, the Contractor must send the Departmental Representative a certificate of conformity signed by a competent mechanic. The Departmental Representative may at any time, if he suspects a failure or a risk of accident, order the immediate shutdown of the equipment and require a second inspection by a specialist of his choice.

.5 For any use of equipment for lifting people or materials, ensure that the inspections required by the standards in force are carried out and be able to provide a copy of the inspection certificates upon request of the Departmental Representative.

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental representative prior to commencement of Work.

.2 Contractor's representative with decision power must attend any meetings at which construction site safety and health issues are to be discussed.

1.6 REGULATORY REQUIREMENTS

.1 Comply with all legislation, regulations and standards applicable to the construction site and its related activities.

.2 Comply with specified standards and regulations to ensure safe operations on a site containing hazardous or toxic materials.

.3 Always use the most recent version of the standards specified in the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), notwithstanding the date indicated in that *Code.*

1.7 COMPLIANCE REQUIREMENTS

.1 Comply with the *Loi sur la santé et la sécurité du travail* (L.R.Q., c. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4.) (Safety code for the construction industry) in addition to respecting all the requirements of this specification manual.

1.8 RESPONSIBILITIES

.1 The Contractor must acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the *Loi sur la santé et la sécurité du travail* (L.R.Q., ch. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry).

.2 The Contractor must be responsible for health and safety of persons on construction site, safety of property on construction site and for the protection of persons adjacent to construction site and the environment to the extent that they may be affected by conduct of the work.

.3 No matter the size or location of the construction site, the Contractor must clearly define the limits of the construction site by physical means and respect all specific regulation requirements applicable in this regard. The means chosen to define the limits of the construction site must be submitted to the Departmental representative.

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

1.9 WORK PERFORMED BY EXTERNAL CONTRACTORS

.1 No object

1.10 GENERAL REQUIREMENTS

.1 Before undertaking the work, prepare a site-specific prevention program based on the hazards identified according to the article “HAZARD ASSESSMENT” and the article “RISKS INHERENT TO THE WORKSITE” in this section. Apply this program in its totality from the start of the project until demobilization of all personnel from the construction site. The prevention program shall take into consideration the specific characteristics of the project and cover all the work to be executed on the construction site.

The safety program must include at least the following:

- .1 company safety and health policy;
- .2 description of the stages of the work;
- .3 total costs, schedule and projected workforce curves;
- .4 flow chart of safety and health responsibilities;
- .5 physical and material layout of the construction site;
- .6 risk assessment for each stage of the work, including preventive measures and the procedures for applying them;
- .7 identification of the preventive measures relative to the specific risks inherent to the worksite indicated in the article “RISKS INHERENT TO THE WORKSITE”;
- .8 identification of preventive measures for health and safety of employees and / or public works site as indicated in the article “SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC”;
- .9 training requirements;
- .10 procedures in case of accident/injury;
- .11 written commitment from all parties to comply with the safety program;
- .12 construction site inspection cheklist based on the preventive measures;
- .13 emergency response plan which shall contain at least the following:
  - .1 construction site evacuation procedures;
  - .2 identification of resources (police, firefighters, ambulance services, etc.);
  - .3 identification of persons in charge of the construction site;
  - .4 identification of the first-aid attendants;
  - .5 communication organizational chart (including the person responsible for the site and the Departmental representative);
  - .6 training required for those responsible for applying the plan;
  - .7 any other information needed, in the light of the construction site’s characteristics.

  If available the Departmental representative will provide the evacuation procedures to the Contractor who shall then coordinate the construction site procedure with that of the site and submit it to the Departmental representative.

.2 Departmental representative may respond in writing, where deficiencies or concerns are noted in the prevention program and may request resubmission with correction of deficiencies or concerns.

.3 In addition to the prevention program, during the course of the work the Contractor shall elaborate and submit to the Departmental representative specific written procedures for any work having a high risk factor of accident (for example: demolition procedures, specific installation procedures, hoisting plan, procedures for entering a confined space, procedures for interrupting electric power, etc.) or at the request of the Departmental representative.

.4 The Contractor shall plan and organize work so as to eliminate the danger at source or ensure collective protection, thereby minimizing the use of personal protective equipment.

.5 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public shall be deemed inadequate for the work to be executed.

.6 All mechanical equipment (for example, but not limited to: hoisting devices for persons or materials, excavators, concrete pumps, concrete saws) shall be inspected before delivery to the construction site. Before using any mechanical equipment, the Contractor shall obtain a certificate of compliance signed by a qualified mechanic dated less than a week prior to the arrival of each piece of equipment on the construction site; the certificate shall remain on the construction site and transmitted to the Departmental representative on demand.

.7 Ensure all inspections (daily, periodic, annual, etc.) for the hoisting devices for persons or materials required by the current standards are carried out and be able to provide a copy of the inspection certificates to the Departmental representative on demand.

.8 The Departmental representative can at all times, if he suspects a malfunction or the risk of an accident, order the immediate stop of any piece of equipment and require an inspection by a specialist of his choice.

.9 The Departmental representative must be consulted for the location of storing gas cylinders and tanks on the construction site.

1.11 RISKS INHERENT TO THE WORKSITE

.1 In addition to the risks related to the tasks to be carried out, personnel responsible for the execution of the work on the construction site will be exposed to the following risks, inherent to the area where the work will be executed..

At the worksite there is in particular the presence of the following:

.1 overhead power lines;

.2 underground services (electric, gas, vapour, water system, etc.);

.3 trees and landscaping to preserve and protect;

.4 potentially unstable ground;

.5 body of water close by;

.6 very slippery ground.

.2 The Contractor shall process to a risk assessment of the site to validate this information and see if other risks are present on the site. He must include in its prevention program all risks that have been identified.

1.12 SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC

.1 The site where the work will take place is occupied by employees and/or the public. Although these persons do not have access to the Contractor's site, the Contractor shall consider the following specific requirements for the protection of employees and/or the public:

.1 Carry out the work while managing the public that may be circulating.

.2 Close public access to the work area.

These requirements must be included in the Contractor’s site-specific safety plan as well as any other measures provided by the Contractor to protect the health and safety of employees and / or the public on the site.

1.13 UNFORESEEN HAZARDS

.1 Whenever a source of danger not defined in the specifications or identified in the preliminary construction site inspection arises as a result of or in the course of the work, the Contractor must immediately suspend work, notify the person responsible for health and safety on the construction site, take appropriate temporary measures to protect the workers and the public and notify Departmental representative, both verbally and in writing. Then the Contractor must do the necessary modifications to the prevention program or apply the security measures required in order to resume work.

1.14 PERSON IN CHARGE OF HEALTH AND SAFETY

.1 When the hiring of a safety officer is not required or if this person is hired by the Departmental representative, the Contractor shall designate a competent person to supervise and take responsibility for health and safety, no matter the size of the construction site or how many workers are present at the workplace. This person shall be on construction site at all times and be able to take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the construction site and likely to be affected by any of the work. The Contractor shall submit the name of this person to the Departmental representative before the start of work.

1.15 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on construction site in accordance with Acts and Regulations of the Province, and in consultation with Departmental representative.

.2 At a minimum, the following information and documents must be posted in a location readily accessible to all workers:

.1 notice of construction site opening;

.2 identification of principal Contractor;

.3 company OSH policy;

.4 site-specific prevention program;

.5 emergency plan;

.6 minutes of worksite committee meetings;

.7 names of worksite committee representatives;

.8 names of the first-aid attendants;

.9 action reports and correction notices issued by the CNESST.

1.16 INSPECTION OF THE CONSTRUCTION SITE AND CORRECTION OF NON-COMPLIANCES

.1 Inspect the construction site and complete the construction site inspection checklist and submit it to the Departmental representative in accordance with the article "ACTION AND INFORMATIONAL SUBMITTALS" in this section.

.2 Immediately take all necessary measures to correct any situations deemed non-compliant during the inspections mentioned in the previous paragraph or noticed by the authorities having jurisdiction or the Departmental representative or his agent.

.3 Submit to Departmental representative written confirmation of all measures taken to correct the situation in case of non-compliance in matters pertaining to health and safety.

.4 The Contractor shall give the safety officer or, where there is no safety officer, the person assigned to safety and health responsibilities, full authority to order cessation and resuming of work as and when deemed necessary or desirable in the interests of safety and health. This person should always act so that the safety and health of the public and construction site workers and environmental protection take precedence over cost and scheduling considerations.

.5 The Departmental representative or his agent may order cessation of work if the Contractor does not make the corrections needed to conditions deemed non-compliant in matters pertaining to health and safety. Without limiting the scope of the preceding articles, the Departmental representative may order cessation of work if, in his view, there is any hazard or threat to the safety or health of construction site personnel or the public or to the environment.

1.17 PREVENTION OF VIOLENCE

.1 Health and safety management of Public Works and Government Services Canada construction sites includeS the implementation of measures designed to protect the psychological health of all persons who access the construction site where the work is taking place. Consequently, in addition to physical violence, verbal abuse, intimidation and harassment are not tolerated on the construction site. Any person who demonstrates such actions or behaviors will receive a warning and/or could be definitely expelled from the construction site by the Departmental representative.

1.18 BLASTING

.1 Blasting or other use of explosvice is strictly prohibited during the entire work.

1.19 POWDER ACTUATED DEVICE

.1 No object

1.20 USE OF PUBLIC ROADS

.1 Where it is necessary to encroach on a public road for operational reasons or to ensure the security of the workers, the occupants or the public (for example: the use of scaffolding, cranes, excavation work, etc.), the Contractor shall obtain at his own expense any authorizations and permits required by the competent authority.

.2 The Contractor shall install at his own expense any signage, barricades or other devices needed to ensure the safety and security of the public and the Contractor's own facilities.

1.21 LOCKOUT-TAGOUT

.1 For all work on electrically or otherwise energized equipment, the Contractor shall draw up and implement a general lockout-tagout procedure and submit it to the Departmental representative.

.2 Supervisors and all workers concerned by work requiring lockout-tagout must have received training on lockout-tagout procedures by a recognized organization; Contractor shall submit training certificates to the Departmental representative.

.3 Before starting the lockout-tagout procedure of a piece of equipment on an occupied site, Contractor must coordinate his work with the representative of the site if the interruption of the power sources can have an impact on the operations of the site or on its occupants.

.4 Contractor must designate a qualified person as responsible for the lockout-tagout and must make sure that that person prepares a lockout-tagout data sheet for each piece of equipment involved. The lockout-tagout data sheet must be submitted to the Departmental representative at least 48 hours before the beginning of the work. The Departmental representative will review the data sheet with the representative of the site if the work takes place in an existing building. The data sheets for lockout-tagout must contain at least the following information:

.1 description of work to carry out;

.2 identification, description and location of the circuit and/or ~~piece of~~ equipment to lockout-tagout;

.3 identification of energy sources that feeds the ~~piece of~~ equipment;

.4 identification of each cutout point;

.5 sequence of lockout-tagout and the release of residual energy as well as the sequence of unlocking;

.6 list of material needed for the lockout-tagout;

.7 method of verification of zero energy implementation;

.8 name and signature of the person who prepared the data sheet.

When required by the Departmental representative, Contractor must record all this information on the site's representative form.

.5 At the time of lockout-tagout, the person responsible must date the data sheet and ensure that each worker involved in the work on the circuit/~~piece of~~ equipment to lockout-tagout puts his name on the data sheet and signs it.

1.22 ELECTRICAL WORK

.1 Contractor shall ensure that all electrical work is executed by qualified employees in accordance with the provincial regulation respecting vocational training and qualification.

.2 Contractor shall respect all requirements of standard CSA Z462 *Workplace Electrical Safety Standard*.

.3 No repairs or alterations shall be carried out on any live equipment except where complete disconnection of the equipment is not feasible.

.4 Contractor shall respect all requirements prescribed in paragraph “LOCKOUT-TAGOUT” in this section.

.5 Contractor shall advise in writing the Departmental representative of all the work that cannot be done with de-energized equipment and obtain his authorization. Contractor shall demonstrate to the Departmental representative that it is impossible to do the work with de-energized equipment and provide all the information necessary to request and obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) before the beginning of the work, excluding for the exceptions indicated in standard CSA Z462 Workplace electrical safety.

.6 The energized electrical work permit on must contain at least the following elements:

a) description of the circuit and equipment and its location;

b) justification for having to do the work in an energized condition;

c) description of safe work practices to apply;

d) results of the shock hazard analysis;

e) limit of the protective perimeter against electric shocks;

f) results of the arc flash hazard analysis;

g) description of the arc flash protection boundary;

h) description of the personal protective equipment required;

i) description of the means to limit access to unqualified persons;

j) proof that an information session has been carried out;

k) approval signature of the energized electrical work (by a person in authority or by the owner).

1.23 ASBESTOS EXPOSURE

.1 No object

1.24 FUNGAL CONTAMINATION

.1 It is not anticipated that the work covered by the present specifications involves the manipulation of materials contaminated by mould; however, if the Contractor or the

Departmental representative or his agent discover materials which are susceptible of being contaminated by mould, the Contractor must immediately stop the work and advise the Departmental representative. If more investigation demonstrates that the materials do contain mould, the Contractor shall comply with the following requirements.

.2 Prior to starting any work where workers are likely to be in contact with materials contaminated by mould, the Contractor must:

.1 Provide a written procedure for the work which respects all the requirements of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry), as well as the requirements indicated in the document "*Mould Guidelines for the Canadian Construction Industry*" published by the Canadian Construction Association (http://www.cca-acc.com/documents/electronic/cca82/cca82.pdf).

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.25 EXPOSURE TO SILICA

.1 For any interior or exterior work generating silica, the Contractor must respect the following requirements, in addition to those in the *Code de sécurité pour les travaux de construction* S-2.1, r.4 (Safety code for the construction industry).

.1 Work in wet environment or use tools with the inflow of water in order to reduce dustiness, if not, collect dust at the source and retain it with a high-efficiency filters not to propagate dust in the environment.

.2 Clean surfaces and tools with water, never with compressed air.

.3 Sand and pickle surfaces by using an abrasive containing less than 1% of silica (also called amorphous silica).

.4 Wear individual respiratory and ocular protection equipment during all the operations that could generate silica dust in accordance with the requirements of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry).

.5 Wear coveralls to prevent contamination outside the construction site.

.6 Do not eat, drink, or smoke in a dusty environment.

.7 Wash the hands and the face before drinking, eating or smoking.

1.26 SANDBLASTING

.1 No object

1.27 LEAD-BASE PAINT REMOVAL

.1 No object

1.28 EXPOSURE TO ANIMAL'S FECAL DROPPINGS

.1 No object

1.29 RESPIRATORORY PROTECTION

.1 Contractor must ensure that all workers who must wear a respirator as part of their duties have received training for that purpose as well as fit testing of their respirator, in accordance with CSA Standard Z94.4 Selection, use and care of respirators. Submit the certificates of the fit testings to the Departmental representative on demand.

1.30 FALL PROTECTION

.1 Plan and organize work so as to eliminate the risk of fall at the source or ensure collective protection, thereby minimizing the use of personal protective equipment. When personal fall protection is required, workers must use a safety harness that complies with CSA standard CAN/CSA Z-259.10 M90. A safety belt must not be used as fall protection.

.2 Every person using an elevating platform (scissors, telescopic mast, articulated mast, rotative mast, etc.) must have a training regarding this equipment.

.3 The use of a safety harness is mandatory for all elevating platforms with telescopic, articulate or rotative mast.

.4 Define the limits of the danger zone around each elevating platform.

.5 All openings in a floor or roof must be surrounded by a guardrail or provided with a cover fixed to the floor able to withstand the loads to which it could be exposed, regardless of the size of the opening and the height of the fall it represents.

.6 Everyone who works within two metres from a fall hazard of three metres or more must use a safety harness in accordance with the requirements of the regulation, unless there is a guardrail or another device offering an equivalent safety.

.7 Despite the requirements of the regulation, the Departmental representative may require the installation of a guardrail or the use of a safety harness for specific situations presenting a risk of fall less than three metres.

.8 The contractor must put in place an attachment system to the rock face in order to be attached at all times during the work.

1.31 SCAFFOLDINGS

.1 No object

1.32 CONFINED SPACES

.1 No object

1.33 EXCAVATION WORK

In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Contractor who performs the digging of trenches or excavations must respect the following requirements:

1. Fill out the following form and submit it to the Departmental representative before beginning to excavation work.

2. Submit to the Departmental representative, as appropriate, the following documents:

    1. plans and specifications, signed and sealed by an engineer, of the shoring needed to be installed for the excavation work; or

    2. engineer’s advice specifying the wall angles of the trench or excavation.

Excavation guidelines

N° ____ of ____

This directive is provided as an example by the Commission de la santé et de la sécurité du travail (CSST). It contains the main instructions that the employer should give to the person responsible for the work on the site and to the operator of the earth-moving machine.

Company name	
Project name	Project no.
Address of the site	Construction start date

Field survey

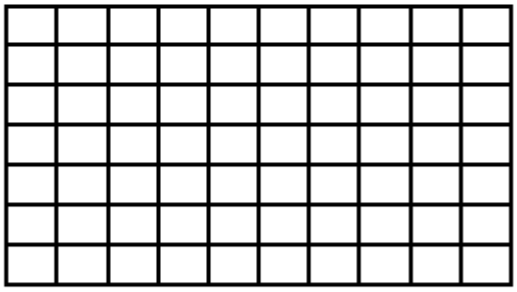
Chaining or axes: from _____ to _____ Attached plan ☐ Plan no. : _____

Working method to use

While making sure the excavation walls do not pose the risk of landslide

- ☐ dig and shore according to the plans and specifications of the engineer ;
- ☐ dig and shore using a trench box ;
- ☐ dig without shoring as long as one of the following conditions is respected:
  - ☐ rock is sound;
  - ☐ no worker goes down in the trench or excavation;
  - ☐ the walls are dug according to the engineer's advice.

Dimensions of excavation (Dig according to the following profile.)



	Minimum	Maximum
H Depth		
Wb Width at bottom Width at top		

Safety measures

Deposit the materials at a distance of at least 1.2 metre (4 feet) from top of walls.
Do not allowed any vehicle to come closer than 3 metres (10 feet) from top of walls.

- ☐ Respect the engineer's plan concerning work in the proximity of an existing facility.
- ☐ Follow the location plan to locate the underground infrastructures.
- ☐ Install signaling devices prescribed in the traffic plan (barriers, visual references, etc.).
- ☐ Assign a flag person or more to control the flow of traffic.
- ☐ Respect the procedure prescribes for work near power lines.
- ☐ Provide protection devices for the workers, such as concrete crash barriers.

Name	Occupation	
Signature	Date	Telephone no.

Directive submitted
☐ to the responsible of the work on the site ☐ to the operator of the earth-moving machine

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1.34 LIFTING LOADS WITH CRANE OR BOOM TRUCK

.1 No object

1.35 HOT WORK

Hot work means any work where a flame is used or a source of ignition may be produced, i.e., riveting, welding, cutting, grinding, burning, heating, etc.

1. Before the beginning of each shift of work and for each sector, the Contractor must obtain a "Hot Work Permit" emitted by the person responsible for the site.

2. A working portable fire extinguisher suitable to the fire risk shall be available and easily accessible within a 5 m radius from any flame, spark source or intense heat.

3. The Contractor must appoint an individual to do continuous monitoring of the fire risks for a period of one (1) hour after the end of the shift of hot work. This individual shall sign the section for this purpose on the permit and give it to the person in charge of the construction site after the one-hour period.

4. When the hot work is done in areas where there is combustible materials or where the walls, ceilings or floors are made of or covered with combustible materials, a final inspection of the work area must be scheduled four (4) hours after the work has finished. Unless specified otherwise by the Departmental representative, the Contractor must assign a person to carry out this monitoring.

Welding and cutting

In addition to the requirements prescribed in the preceding paragraphs, the Contractor must respect the following requirements:

5. Welding and cutting work must be carried out in accordance with the requirements of the *Code de Sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry) and CSA standard W117.2, Safety in Cutting, Welding and Allied Processes.
6. Air extraction system with filters must be used for all welding and cutting work performed inside.
7. Stop all activities producing flammable or combustible gas, vapours or dust in the vicinity of the welding or cutting work.
8. Store all compressed gas cylinder on a fireproof fabric and make sure that the room is well ventilated.
9. Store all oxygen cylinders more than 6 metres from a flammable gas cylinder (ex: acetylene) or a combustible such as oil or grease, unless the oxygen cylinder is separated from it by a wall made of non-combustible material as mentioned inthe article 3.13.4 of the *Code de sécurité pour les travaux de construction, S-2, r. 6* (Safety code for the construction industry)
10. Store the cylinders far from all heat sources.
11. Not to store the cylinders close to the staircases, exits, corridors and elevators.

12. Do not put acetylene in contact with metals such as silver, mercury, copper and alloys of brass having more than 65% copper, to avoid the risk of an explosive reaction.
13. Check that welding equipment with electric arc has the necessary tension and are grounded.
14. Ensure that the conducting wires of the electric welding equipment are not damaged.
15. Place the welding equipment on a flat ground away from the bad weather.
16. Install fireproof canvas when the welding work is done in a superposition and where there is the risk of falling sparks.
17. Move away or protect the combustible materials which are closer than 15 metres from the welding work.
18. Prohibition to weld or cut any closed container.
19. Do not perform any cutting, welding or work with a naked flame on a container, a tank, a pipe or other container containing a flammable or explosive substance unless:
    i. they have been cleaned and air samples indicating that work can be done without danger has been taken; and
    ii. provisions to ensure the safety of the workers have been made.

1.36 ROOFING WORK

.1 No object

1.37 STEEL STRUCTURE ERECTION OR DISMANTLING WORK

.1 No object

1.38 WORK NEAR BODIES OF WATER

.1 No object

1.39 INTERIOR USE OF INTERNAL COMBUSTION ENGINES

.1 No object

1.40 TEMPORARY HEATING

.1 No object

1.41 WORK NEAR OVERHEAD POWER LINES

.1 No object

1.42 DIVING OPERATIONS

.1 No object

Partie 2 PRODUCT

2.1 NO OBJECT

.1 No object

Partie 3 EXECUTION

3.1 NO OBJECT

.1 No object

END OF THE SECTION

Part 1 General

1.1 DEFINITION

.1 Pollution and environmental damage: the presence of chemical, physical or biological elements or agents that have a harmful effect on human health and well-being-, that alter the ecological balance important to humans and that constitute an attack on species that play an important role for them or that degrade the aesthetic, cultural or historical characteristics of the environment.

.2 Environmental protection: prevention/control of pollution and disruption of the habitat and environment during construction. Prevention of pollution and environmental damage includes protection of land, water, air, biological and cultural resources; it also includes management of visual aesthetics, noise, solid, chemical, gaseous and liquid wastes, radiant energy, radioactive materials and other pollutants.

1.2 DOCUMENTS AND SAMPLES TO BE SUBMITTED

.1 Submit required documents and samples in accordance with Section 01 33 00 -Documents and Samples to be Submitted.

.2 Prior to the commencement of construction activities or delivery of materials and equipment to the site, submit an Environmental Protection Plan to the Department Representative for review and approval. The plan shall provide a comprehensive overview of known or potential environmental issues to be addressed during construction.

.3 The actions included in the environmental protection plan must be presented at a level of detail that is consistent with the environmental issues and the construction work to be performed.

.4 The environmental protection plan shall include:

.1 the names of the persons responsible for ensuring compliance with the plan;

.2 the names and qualifications of the persons responsible for the manifests of hazardous waste to be removed from the site;

.3 the names and qualifications of the persons responsible for the training of site personnel;

.4 a description of the training program for environmental protection personnel;

.5 an erosion and sediment transport prevention plan, outlining the measures that will be implemented, including monitoring and reporting to ensure compliance with federal, provincial and municipal laws and regulations

.6 a plan of the work area, showing the activities to be carried out in each part of the work area and indicating restricted and prohibited areas; the plan shall indicate measures to mark the boundaries of the usable areas

and methods of protecting features within the permitted work areas that are to be preserved

.7 a spill contingency plan, including procedures to be followed, instructions to be followed and reports to be filed in the event of an unexpected spill of a controlled substance;

.8 a non-hazardous solid waste disposal plan, indicating the methods and locations of disposal of such solid waste, including debris from the excavation work;

.9 an air pollution prevention plan, indicating measures to prevent dust, debris, materials and waste from being transported by air off the site

.10 a contamination prevention plan, identifying the potentially hazardous substances that will be used on the site, the actions that will be taken to prevent these substances from becoming airborne or entering the ground, and details of the measures that will be taken to ensure that the storage and handling of these substances will comply with federal, provincial and municipal laws and regulations

.11 a wastewater management plan, indicating the methods and procedures to be implemented for the management or disposal of wastewater directly resulting from construction activities, such as water used for curing concrete, washing/cleaning, groundwater drawdown, disinfection, hydrostatic testing and pipe flushing;

.12 a plan for the identification and protection of wetlands and historic, archaeological, cultural and biological resources.

1.3 FIRE

.1 Fires and burning of waste on the site are prohibited.

.2 Arrange for work supervision and fire protection as directed.

1.4 WASTE DISPOSAL

.1 The burial of waste and scrap materials on the construction site and on the site is prohibited.

.2 No person shall dispose of waste materials or volatile materials such as mineral spirits, oils or paint thinners by discharging them into a watercourse, storm sewer or sanitary sewer.

1.5 TREE PROTECTION

.1 Provide tree protection in the area of the construction site throughout the construction period.

.2 It is strictly forbidden to cut down trees during the work.

1.6 SLOPE PROTECTION AND SEDIMENT BARRIER

.1 Provide a geotextile membrane over the excavated wall to prevent any material from eroding down the slope.

.2 Provide a sediment barrier to prevent any material from entering the embankment.

1.7 STACKING OF EXCAVATED MATERIAL

.1 The contractor shall pile up the excavation material from the work area for completion.

.2 Provide a geomembrane under the pile to avoid mixing the pile with the surrounding soil.

.3 Provide for stacking in the NBC material storage site located on upper Gilmour Hill.

1.8 DRAINING

.1 Provide temporary drainage and pumping, necessary to keep the excavations and work site dry.

.2 No person shall pump water containing suspended solids into a watercourse, sewer system or drainage system.

.3 Dispose of or dispose of water containing suspended solids or harmful substances in accordance with local authority requirements.

1.9 POLLUTION PREVENTION

.1 Maintain temporary erosion and pollution prevention facilities installed under this contract.

.2 Ensure control of emissions from equipment and tooling as required by local authorities.

.3 Construct temporary shelters to prevent blasting materials and other foreign matter from contaminating air and waterways -beyond the application area.

.4 Water down dry materials and cover waste to prevent wind from kicking up dust or blowing debris away. Suppress dust on temporary roads.

1.10 NOTICE OF NON-COMPLIANCE

.1 A -written notice of noncompliance -will be issued to the Contractor by the Departmental Representative whenever there is a finding of noncompliance -with any federal, state or municipal law, regulation or permit, or any other element of the environmental protection plan implemented by the Contractor.

.2 Upon receipt of a notice of noncompliance-, the Contractor shall propose corrective action to the Department Representative, and implement it with the approval of the Department Representative. -

.3 The Department Representative will order the work stopped until satisfactory corrective action is taken.

.4 No additional time or adjustments will be granted for the cessation of work.

Part 2 Product

2.1 NO OBJECT

.1 Not applicable.

Part 3 Execution

3.1 NO OBJECT

.1 Not applicable.

END OF SECTION

Part 1 General

1.1 INSPECTION

.1 The Departmental Representative shall have access to the works. If any part of the work or structures is performed off-site, access to that area shall also be provided to the Departmental Representative throughout the duration of the work.

.2 Where special inspections, approvals or tests of the Work are required by the Department's Representative or by local regulations governing the site, request them within a reasonable time.

.3 If the Contractor has covered or allowed to be covered any work before it has been subjected to the required inspections, approvals or special tests, the Contractor shall uncover the work in question, see that the required inspections or tests are performed to the satisfaction of the authorities having jurisdiction, and then restore the work to its original condition.

.4 The Department Representative may order an inspection of any portion of the Work where compliance with the Contract Documents is in doubt. If, upon examination, the work in question is found not to conform to the requirements of the Contract Documents, the Contractor shall take such action as may be necessary to bring the work into conformity with the specified requirements, and shall bear the cost of inspection and repair. If the Work in question is found to be in compliance with the requirements of the Contract Documents, the Department Representative shall bear the cost of inspection and repair so incurred.

1.2 INDEPENDENT TESTING AND INSPECTION AGENCIES

.1 The contractor will be responsible for retaining independent testing and inspection agencies. The cost of these services will be borne by the contractor.

.2 Provide materials required by designated agencies to perform tests and inspections.

.3 The use of testing and inspection agencies does not relieve the Contractor of responsibility for the performance of the work in accordance with the requirements of the Contract Documents.

.4 If defects are found during testing and/or inspection, the designated agency will require further inspection and/or additional testing to accurately define the nature and extent of such defects. The Contractor shall correct the defects and imperfections as directed by the Department Representative, at no additional cost to the Department Representative, and shall bear the cost of the testing and inspection required after such corrections.

1.3 ACCESS TO THE SITE

.1 Allow testing and inspection agencies access to the job site as well as to fabrication and shaping shops located off-site.

.2 Cooperate with these agencies and take all reasonable steps to ensure that they have the appropriate means of access.

1.4 PROCEDURE

.1 Notify the appropriate agency and the Department Representative in advance when testing is required so that all parties involved can be present.

.2 Submit samples and/or materials/materials for testing as specified in the specifications, in a timely manner and in a predetermined order so as not to delay the performance of the work.

.3 Provide manpower and facilities to collect and handle samples and materials/materials on site. Also provide space for storage and curing of samples.

1.5 CONTROL AND INSPECTION OF WELDS

.1 Provide written description of welding procedures for approval to the Department Representative at least five (5) days prior to commencement of work.

.2 Coupons and testing fees will be the responsibility of the contractor. Welders who do not meet the requirements will not be allowed to perform the work.

.3 The Department Representative reserves the right to examine welds made at the job site. The cost of such examinations shall be at the expense of the Departmental Representative.

.4 The Contractor shall provide the Department Representative with all facilities and assistance necessary for the examination of the welds.

.5 If the inspections reveal a defect to be repaired, the weld shall be repaired and re-inspected. The Contractor shall modify his welding method to eliminate the defects found. The repairs and second inspection shall be at the Contractor's expense.

.6 Allow the Department Representative to conduct inspections at the manufacturing, assembly and/or mounting facility.

.7 Report to the Department Representative any deficiencies in equipment or difficulties in assembly at the job site. Corrections, if any, shall be made to the satisfaction of the Department Representative.

1.6 REJECTED WORKS OR STRUCTURES

.1 Remove defective items found to be inconsistent with the Contract Documents and rejected by the Departmental Representative, either because they were not performed in a workmanlike manner or because they were made with defective materials or products, even if they have already been incorporated into the Work. Replace or remake the elements in question according to the requirements of the contract documents.

.2 Where applicable, promptly repair the Work of other contractors which has been damaged in the course of the above repair or replacement work.

.3 If, in the opinion of the Department Representative, it is not expedient to repair work that is defective or found not to be in accordance with the Contract

Documents, the Owner shall deduct from the Contract Price the difference in value between the work performed and that prescribed in the Contract Documents, the amount of such difference to be determined by the Department Representative.

1.7 REPORTS

.1 Provide three (3) copies of test and inspection reports to the Department Representative.

.1 Requested reports include, but are not limited to:

.1 Report attesting to the conformity of the welds according to the CSA W59 standard

.2 Report attesting that the piles have reached a minimum of 1.2m in sound rock.

.3 Report certifying conforming soil compaction.

.2 Provide copies of these reports to subcontractors -responsible for the structures inspected or tested.

1.8 SAMPLES OF WORKS

.1 Prepare samples of the Work specifically required in the Specifications. The requirements of this section apply to all sections of the specifications in which samples of work are requested.

.2 Construct the sample works at the various locations approved by the Department Representative.

.3 Prepare samples of the Work for approval by the Departmental Representative within a reasonable time and in a predetermined sequence so as not to delay the execution of the Work.

.4 Delay in the preparation of samples of the work shall not be sufficient reason for an extension of time for completion of the work and no such request shall be granted.

.5 If necessary, the Department Representative will assist the Contractor in establishing a schedule for the preparation of work samples.

.6 Accepted samples of work may be part of the finished work.

.7 Each section of the specifications that refers to samples of the work shall specify whether or not the samples may be part of the finished work and when they are to be removed, if at all.

1.9 FACTORY TESTS

.1 Submit certificates of factory tests required or prescribed in the various sections of the specifications.

Part 2 Products

2.1 STEEL AND WELDS

.1 Use materials that are free of dirt, rust and corrosion, chips, pitting, lamination or any other defect. No used material will be accepted.

.2 Structural steel: conforms to CAN/ CSAG40-.20/G40.21 standards.

.1 Tubular sections (HSS) round: grade 345 W according to ASTM A500.

.2 Other standard profiles and plates: grade 350W.

.3 Welding materials: conform to CSA W48 and CSA W59 standards and approved by the Canadian Welding Bureau. E70XX grade electrodes unless otherwise specified.

.4 Hot dip galvanizing: Zinc layer thickness should be in accordance with ASTM-A123 table. Perform SSPC SP-6 cleaning prior to galvanizing. Touch up with zinc rich paint in accordance with ASTM-A780 and CGSB CAN/CGSB-1.181.

.5 Paint for touching up galvanized surfaces: zinc rich primer, conforms to CGSB 1-GP-181a.

Part 3 Execution

3.1 NO OBJECT

.1 Not applicable.

END OF THE SECTION

Part 1 General

1.1 WORK AREAS

.1 Work areas that are available to the Contractor will be shown on the plans.

.2 Restrict occupancy to designated areas unless authorized in writing by the Departmental Representative.

.3 Prior to the commencement of work, submit for approval a site facility layout plan (work methodology, outdoor storage areas, position of temporary fencing and other pertinent details).

1.2 ACCESS ROUTES

.1 Existing roads must be maintained during the construction period and any damage that may result from their use must be repaired.

.2 Clean up runways and taxiways that have been used by the Contractor's vehicles.

1.3 STORAGE OF EQUIPMENT, MATERIALS AND TOOLS

.1 Provide lockable, weatherproof sheds for the storage of equipment, materials and tools and keep them clean and tidy.

1.4 SANITARY FACILITIES

.1 Provide sanitary facilities for workers in accordance with applicable ordinances and regulations.

.2 Post required notices and take all precautions required by local health authorities. Keep the premises and area clean.

1.5 WATER SUPPLY

.1 To provide and pay for the temporary supply and maintenance of potable water in accordance with applicable regulations and ordinances.

1.6 ELECTRICAL ENERGY

.1 To ensure the temporary supply of electrical energy and to assume the costs and maintenance according to the regulations and ordinances in force.

1.7 PARKING

.1 Develop off-site parking areas. Maintain and administer parking areas as directed by the Departmental Representative.

1.8 SITE ENCLOSURE

.1 Erect temporary fencing around site accesses and for protection required during construction as required. Keep fence in good repair.

.2 Rigidly attach the fence to the ground so that alignments and verticality are maintained at all times.

.3 Add the bracing required to withstand all loads to which the fence may be subjected.

.4 Fences shall be constructed to facilitate the installation of materials and work within the site.

.5 Check the condition of the fence daily.

Part 2 Product

2.1 NO OBJECT

.1 Not applicable.

Part 3 Execution

3.1 TEMPORARY MEANS OF EROSION AND SEDIMENT CONTROL

.1 Provide temporary erosion and sediment control measures to prevent the loss of soil from stormwater runoff or wind erosion and the washing of soil onto adjacent properties and walkways.

.2 Inspect, maintain, and repair established controls as necessary until permanent vegetation is well established.

.3 Remove the control media at the appropriate time and restore and stabilize the areas disturbed during this work.

END OF THE SECTION

Part 1 General

1.1 CLEANLINESS OF THE SITE

.1 Keep the job site clean and free of any accumulation of debris and waste materials, other than those generated by the General Contractor or other contractors.

.2 Evacuate debris and waste materials from the work site daily at predetermined times or dispose of them as directed by the Department Representative.

.3 Burning of waste materials on the site is prohibited.

.4 Arrange for and obtain permits from the appropriate authorities for the disposal of debris and waste materials.

.5 Provide on-site containers for the disposal of debris and waste materials.

.6 Dispose of debris and waste materials off site.

1.2 FINAL CLEANING

.1 Upon substantial completion of the Work, remove surplus materials, tools, and construction equipment and materials no longer required for the remainder of the Work.

.2 Remove debris and waste materials, except those generated by other contractors, and leave the site clean and ready for occupancy.

.3 Before final inspection, remove excess materials, tools, equipment and construction materials.

.4 Remove debris and waste materials.

.5 Evacuate waste materials from the site at predetermined times or dispose of them as directed by the Department Representative.

.6 Waste materials should not be burned on the job site.

.7 Arrange for and obtain permits from the appropriate authorities for the disposal of debris and waste materials.

.8 Sweeps and cleans sidewalks, steps and other surfaces; sweeps or rakes rest of grounds.

.9 Remove dirt and other elements that mar the exterior surfaces.

Part 2 Product

2.1 NO OBJECT

.1 Not applicable.

Part 3 Execution

3.1 NO OBJECT

.1 Not applicable.

END OF THE SECTION

Part 1 General

1.1 DOCUMENTS/SAMPLES TO BE SUBMITTED

.1 Submit required documents and samples in accordance with Section 01 33 00 -Documents and Samples to be Submitted.

.2 The instructions must be prepared by competent persons with the required knowledge of the operation and maintenance of the products described.

.3 Submitted copies will be returned after final inspection of the work, along with the Department Representative's comments.

1.2 DOCUMENTS AND SAMPLES TO BE INCLUDED IN THE PROJECT FILE

.1 Maintain on the job site, for the Department Representative, a copy or set of the following documents:

- .1 contractual drawings;
- .2 quote;
- .3 addenda;
- .4 Change orders and other contract amendments;
- .5 revised shop drawings, technical data sheets and samples;
- .6 records of on-site testing;
- .7 inspection certificates;
- .8 certificates issued by the manufacturers.
- .9 a survey of the wall location
- .10 tests reports
- .11 the photographic report of the work

.2 The Department Representative shall have access to documents and samples in the project file for inspection.

1.3 RECORDING OF FIELD CONDITIONS

.1 Record the information on a set of opaque red line drawings provided by the Department Representative.

.2 Contract and Shop Drawings: Indicate each item of data to show the work as it is, including the following.

- .1 On-site modifications to the dimensions and details of the work.
- .2 Changes made as a result of change orders.

.3 Other Documents: Maintain manufacturers' certificates, inspection certificates, records of field tests required in each technical section of the specifications.

1.4 MATERIALS AND FINISHING PRODUCTS

.1 Building materials, finishes and other products to be applied: provide data sheets, catalog numbers, dimensions, composition, and color and texture designations of products and materials. For replenishment purposes, provide information on special products.

Part 2 Product

2.1 NO OBJECT

.1 Not applicable.

Part 3 Execution

3.1 NO OBJECT

.1 Not applicable.

END OF THE SECTION

APPENDIX A - GEOTECHNICAL STUDY REPORT

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Gilmour Hill
Road section between avenue de Laune and boulevard Champlain, Québec

Geotechnical Study Report

Date : February 2014
Reference No : 072-P033959-0109-GE-0001-00-ANG

LVM

LVM

February 5, 2014

Mr. Daniel Leclerc, Eng.
Public Works and Government Services Canada
3, Passage du Chien d'Or, C.P. 6060 Haute-Ville
Québec (Québec) G1R 4V7

Objet : *Gilmour Hill*
Road section between avenue de Laune and boulevard Champlain, Québec
Geotechnical Study Report
N/Ref.: 072-P033959-0109-GE-0001-00-ANG

Mr Leclerc,

We have the pleasure of transmitting to you the attached copie of our geotechnical study report concerning the referenced project. A PDF copy has been sent to you by e-mail. A French version of this report has already been transmitted.

We hope that the information contained in this report will be useful to you. Please do not hesitate to contact us if you have any questions concerning this study.

Sincerely,

LVM

Julie Dostie, Eng.
Geotechnical project Manager

JD/vc

p.j.

LVM

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

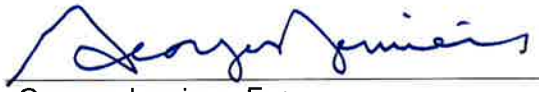
Gilmour Hill
Road section between avenue de Laune and boulevard Champlain, Québec

Geotechnical Study Report

Prepared by :

Julie Dostie, Eng.
Geotechnical Project Manager
OIQ Member No. : 131288

Reviewed by :



Georges Lemieux, Eng.
Project Director – Eastern Quebec
OIQ Member No.: 32199

LVM

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Property et confidentiality

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If tests have been performed, their results are valid only for the samples described in this report.

The subcontractors of LVM who performed the site work or laboratory work are duly qualified according to the procedure relative to the provisions in our quality manual. For more information, please contact your project manager »

REGISTRE DES RÉVISIONS ET ÉMISSIONS		
No de révision	**Date**	**Description de la modification et/ou de l'émission**
0A	2011-07-20	Preliminary Report (French version)
00	2011-08-09	Final Report (French version)
00	2014-02-05	Final Report (English version)

1 INTRODUCTION

LVM's services were retained by Public Works and Government Services Canada (PWGSC) in order to perform a geotechnical study regarding the project « Étude d'évaluation des enjeux liés à l'ouverture de la Côte Gilmour en saison hivernale ». The geotechnical study refers more specifically to the road section located between avenue de Laune and boulevard Champlain in Quebec City. This study was performed in accordance with our proposal number 11-0303-072, dated June 15, 2011 and accepted by the client on June 20, 2011.

The site works have been established by Public Works and Government Services Canada (PWGSC). They have been conducted in order to determine the nature and properties of the soils in place, evaluate the groundwater conditions and provide recommendations concerning the pavement design.

This report contains details of methods used to perform the subsurface exploration and laboratory testing, a description of the nature and properties of the soils, the groundwater conditions and our recommendations.

The terms defining the basis and range of this study are presented in Appendix 1 and are important to review for a better understanding of this report. The additional appendices provided the explanation note on sounding logs, the borehole reports, the laboratory test results, some photographs and the borehole location plan.

2 GEOTECHNICAL INVESTIGATION METHOD

The nature and soil properties were determined by both a subsurface field exploration and laboratory testing.

2.1 SUBSURFACE EXPLORATION

The field exploration was performed on July 4, 2011 from 9:00 am to 6:00 pm. Five (5) boreholes were drilled at the locations shown on the boring location plan No. 072-P033959-0109-GE-0001-00-ANG provided in Appendix 5. The boreholes siting was realized by LVM personnel in collaboration with the client representative.

2.1.1 Boreholes

The boreholes, identified as TF-01-11 to TF-05-11, were drilled using a trailer-mounted, hydraulic drilling rig (type UM 2008) with an automatic hammer to depths ranging from 0.83 to 6.22 meters below the existing ground surface.

Soil sampling was performed using either a large diameter (caliber PW) sampler or a 51 millimeters diameter (caliber B) split-spoon sampler. The rock was cored in borehole TF-03-11 using a double-barreled, diamond bit core barrel of caliber NQ.

Polyethylene observation tubes with a diameter of 20 millimeters and partially perforated were installed in the boreholes for groundwater measurements.

2.1.2 Borehole Locations and Elevations

The borings were located by LVM personnel. Their approximate location is shown on the boring location plan No. 072-P033959-0109-GE-0001-00-ANG provided in Appendix 5.

The boreholes were realized in the pavement center. The GPS coordinates of each borehole were obtained with a Garmin GPSMAP 60Cx model GPS and are given on the borehole reports.

2.1.3 Supervision

The subsurface exploration was performed under the supervision of a soils technician. He located the boring locations, directed and coordinated the field operations, identified the samples recovered, measured the groundwater levels and prepared the borehole reports.

2.2 LABORATORY TESTING

The soil samples obtained from the boreholes were transported to our laboratory where they were examined visually by the project engineer in charge of the study.

The laboratory analyses were conducted on representative soil samples to determine the nature and properties of the soils in place. A list of the tests performed is provided in Table 1 below. The results are presented in Appendix 3.

Table 1 : Laboratory Tests Performed

ESSAI	QUANTITÉ
Grain-Size (sieve) Analysis LC 21-040	6
Sedimentary (hydrometer) Analysis LC 21-040	2
Moisture Content NQ 2501-170	6
Liquid and Plastic Limits Test BNQ 2501-100	2

The samples were stored for a period of three months from the issue date of the final report (French version) and have been disposed of since no request has been submitted by Public Works and Government Services Canada.

3 NATURE AND PROPERTY OF SOILS

3.1 STRATIGRAPHY

A summary of the stratigraphy of the boreholes is presented in Table 2. A detailed description of the material encountered is presented on the borehole reports in Appendix 2.

It is noted that the term « depth » always refers to the ground surface at the time of the field works.

Table 2 : Summary of the Stratigraphy of the Boreholes

BOREHOLE NO.	TF-01-11	TF-02-11	TF-03-11	TF-04-11	TF-05-11
DESCRIPTION OF MATERIAL	Depth / Thickness (m)				
Asphalt pavement	0.00 to 0.15 0.15	0.00 to 0.15 0.15	0.00 to 0.12 0.12	0.00 to 0.17 0.17	0.00 to 0.10 0.10
Fill : rock fragments mixed with sand	0.15 to 0.35 0.20	0.15 to 0.35 0.20	--	--	--
Fill : crushed stone of apparent type MG-20	--	--	0.12 to 0.62 0.50	0.17 to 0.56 0.39	0.10 to 0.35 0.25(3)
Fill : crushed stone of apparent type MG-56 mixed with sand	--	--	--	--	0.35 to 0.81 0.46
Fill : sand with traces of silt and traces of gravel	--	--	--	--	0.81 to 1.52 0.71
Sand with some silt to silty sand, traces of gravel and traces of clay in places	--	--	--	--	1.52 to 3.05 1.53(4)
Rock	0.35 to >1.88 >1.53(1)(2)	0.35 to >0.83 >0.48	0.62 to >6.22 >5.60	0.56 to >5.18 >4.62	3.05 to >4.57 >1.52(5)
End of Borehole	1.88	0.83	6.22	5.18	4.57

Notes : -- Layer not encountered
> Greater than
(1) Presence of traces of organic matter and roots at layer's top boundary
(2) Weathered rock similar to a soil between 0.35 and 1.88 meters depth
(3) Crushed stone of apparent type MG-20 mixed with sand
(4) Presence of sand beds, organic matters and decomposed wood particles between 1.52 and 2.13 meters depth and presence of organic matter between 2.13 and 3.05 meters depth
(5) Presence of traces of organic matter at layer's top boundary.

3.2 ASPHALT PAVEMENT

A layer of asphalt pavement with a thickness varying between 0.10 and 0.17 meter covers the ground surface at boreholes location.

3.3 FILL

Fill materials are present under the asphalt pavement at each borehole. The total fill thickness is 0.20; 0.20; 0.50; 0.39 and 1.42 meter at boreholes TF-01-11 to TF-05-11, respectively.

At boreholes TF-01-11 and TF-02-11, the fill materials are composed of rock fragments mixed with gray sand.

At boreholes TF-03-11 and TF-04-11, the fill materials are composed of gray crushed stones of apparent type MG-20.

At borehole TF-05-11, the first 0.25 meter of fill is composed of crushed stone of apparent type MG-20 mixed with brown sand. Below that, the fill materials are composed of crushed stone of apparent type MG-56 mixed with brown sand for a 0.46 meter thick horizon. Finally, the last 0.71 meter of fill consists of brown sand with traces of silt and traces of gravel.

The laboratory analysis results performed on four sample of fill materials are summarized in Table 3. The grain size analysis curves are shown in Figures 1 to 4 in Appendix 3.

Table 3 : Summary of the laboratory analysis results – Fill

MATERIAL	(1)	(2)	(2)	(3)
Borehole No Sample No Depth (m)	TF-01-11 PW-1A 0.15 to 0.35	TF-03-11 PW-1A 0.12 to 0.62	TF-04-11 PW-1A 0.17 to 0.56	TF-05-11 PW-1B 0.35 to 0.81
MATERIAL COMPONENT (%)				
Gravel	75	43	42	55
Sand	20	49	50	39
Silt	5	8	8	6
WATER CONTENT				
w (%)	2.2	3.3	3.1	2.7
UNIFIED SOIL CLASSIFICATION	GP-GM	SW-SM	SW-SM	GP-GM
FIGURE No	1	3	4	5

Notes : (1) Rock fragments mixed with sand
(2) Crushed stone of apparent type MG-20
(3) Crushed stone of apparent type MG-56, mixed with sand

3.4 SAND WITH SOME SILT TO SILTY SAND, TRACES OF GRAVEL AND TRACES OF CLAY IN PLACES

A layer of gray sand with some silt to silty sand, traces of gravel and traces of clay in places was encountered under the fill materials in borehole TF-05-11. This layer has a thickness of 1.53 meter.

This layer also contained the presence of sand beds, organic matters and decomposed wood particles at depth between 1.52 and 2.13 meters and traces of organic matters at depth between 2.13 and 3.05 meters.

The laboratory analysis results performed on a sample of this material are summarized in Table 4 and the detailed results are presented in Appendix 3.

Table 4 : Summary of the laboratory analysis results – Sand with some silt to silty sand, traces of gravel and traces of clay in places

Borehole No Sample No Depth (m)	TF-05-11 CF-3 1.52 to 2.13
MATERIAL COMPONENT (%)	
Gravel	4
Sand	72
Silt	17
Clay	7
WATER CONTENT	
w (%)	25.1
ATTERBERG LIMITS	
Liquidity limit w_L (%)	28.8
Plasticity limit w_P (%)	24.8
Plastic index I_P (%)	4.0
Liquid index I_L	0.1
UNIFIED SOIL CLASSIFICATION	SM
FIGURES Nos	5 and 6

3.5 ROCK

The rock was encountered in boreholes TF-01-11 to TF-05-11 at depths of 0.35; 0.35; 0.62; 0.56 and 3.05 meters, respectively.

The rock is generally weathered or fractured and was sampled with a split-spoon sampler on varying thicknesses. In borehole TF-01-11, the rock is weathered and similar to a soil. The particle size distribution of sample CF-2 from borehole TF-01-11 consists of clayey silt with traces of sand and traces of gravel.

The auger refusal on possible solid rock was obtained at depth of 1.88; 0.83 and 2.74 meters in boreholes TF-01-11 to TF-03-11, respectively. Boreholes TF-04-11 and TF-05-11 were terminated in the rock at a respective depth of 5.18 and 4.57 meters, without obtaining a auger refusal.

The rock was cored in borehole TF-03-11 from a depth of 2.74 meter. The rock is described as a gray argillaceous limestone having a very poor rock quality until 4.18 meters depth and a poor to fair rock quality afterward. The rock core recovery varies from 65 and 100 % and the Rock Quality Designation index (RQD) varies from 0 to 85 %.

The photographs No. 6 placed in Appendix 5 shows the aspect of the rock cores recovered in borehole TF-03-11.

The boreholes TF-01-11 to TF-05-11 were terminated in the rock at depths of 1.88; 0.83; 6.22; 5.18 and 4.57 meters, respectively.

Some laboratory analyses were performed on a sample of weathered rock similar to a soil from borehole TF-01-11 in order to determine the nature and properties. The results are summarized in Table 5 and detailed in Appendix 3.

Table 5 : Summary of the laboratory analysis results – Weathered rock similar to a soil

Borehole No Sample No Depth (m)	TF-01-11 CF-2 0.91 à 1.52
MATERIAL COMPONENT (%)	
Gravel	2
Sand	10
Silt	64
Clay	24
WATER CONTENT	
w (%)	24.3
ATTERBERG LIMITS	
Liquidity limit w_L (%)	47.2
Plasticity limit w_P (%)	26.3
Plastic index I_P (%)	20.9
Liquid index I_L	0
UNIFIED SOIL CLASSIFICATION	CL
FIGURES Nos	1 and 2

4 GROUNDWATER

The groundwater levels were measured in the installed observation tubes on July 15, 2011. The results are presented in the Table 6 as well as on the borehole reports provided in Appendix 2. They do not represent the stabilized groundwater level.

Table 6 : Groundwater Levels

Borehole No.	DATE (yy-mm-dd)	Groundwater
		Depth (m)
TF-01-11	11-07-15	>1.88
TF-02-11	11-07-15	0.79
TF-03-11	11-07-15	1.63
TF-04-11	11-07-15	4.97
TF-05-11	11-07-15	0.37

Note : > Greater than (no water was noted in the observation tube at the time of the measure)

The "Scope of the Geotechnical Study" provided in Appendix 1 contains important points to consider when interpreting the groundwater conditions.

5 DISCUSSION ET RECOMMENDATIONS

The project concerns the opening of Gilmour Hill in winter for the road section located between avenue de Laune and boulevard Champlain in Quebec City. Based on the transmitted informations, the traffic is evaluated to approximately 4 900 vehicles northbound and 4 400 vehicles southbound, per 24 hours. It is noted that pipe laying is not planned for this project. Also, the retaining wall study and the slope stability are not included in the mandate.

The recommendations presented in the following paragraphs are based on the results obtained from the boreholes and laboratory tests as well as the information provided by the client.

According to the borehole results, the actual pavement structure is not sufficient in some boreholes to have a good winter behavior of the road. Indeed, the asphalt pavement thickness is not sufficient at the boreholes locations TF-03-11 and TF-05-11, the base thickness is too thin at boreholes TF-01-11 and TF-02-11 location and the subbase is not sufficient at the location of borehole TF-01-11. The following paragraphs present the recommendations related to the road refection. The minimum recommended thickness of the pavement structure is presented in Table 7 of chapter 5.6.

Our recommendations are addressed to our client and to their professionals for the preparation of plans and cost estimates. The contractor must rely on their experience and their interpretation of our results in order to determine which of the subsurface conditions could influence their work.

5.1 FROST PROTECTION

In this region, effects of freezing and thawing will affect materials to a depth of approximately 1.80 meters.

All structures exposed to freezing and thawing effects have to be protected by a minimal soil recovery of 1.80 meter or an equivalent thermal insulation.

5.2 EXCAVATION AND DEWATERING

5.2.1 Earthwork and Excavation Conditions

The excavations will be realized in soils and partly in rock.

The requirements of the CSST must be respected when excavating and also the particular recommendations presented in the following paragraphs.

5.2.2 Excavation Slopes

The excavation slopes and/or the retaining method and dewatering works will have to ensure the stability of the excavation walls and bottom, at all time.

The requirements contained within the most recent version of the *Code de sécurité pour les travaux de construction* and the requirements of the CSST must be respected when excavating. During construction, since the excavation slopes are temporary, it is the contractor responsibility to assure that the excavation slopes are stables and secures. The recommended slopes are only addressed to the designer for purposes of technical and economic studies.

For preliminary calculation of the cost by volume, we recommend limiting the temporary slopes for small depths excavation in soils or weathered rock to 1.0 horizontal to 1.0 vertical from the bottom of the excavation. These slopes suppose an adequate dewatering. In case of saturated soil, lower slopes and special precautions are needed.

In case of excavation in rock of better quality, the slopes must be adjusted as a function of the actual conditions observed during excavation and also as a function of the excavation methods used by the contractor. For preliminary calculation, slopes of 1.0 horizontal to 4.0 vertical can be considered by the designer.

In soils as in rock, excavation walls should be uniform. Cobbles and boulders protruding and loose or shaken rock fragments should be removed.

Regular verification of the slope stability must be performed in order to confirm the slopes security and/or make appropriate adjustments should be made when necessary to ensure stability. A geotechnical engineer should be consulted, if needed.

5.2.3 Dewatering

According to the groundwater level measurement from the installed observation tubes, we expect water seepage in excavations. It should be noted that the water seepage from the rock depend on the number and size of fractures in the rock and the degree of interconnection between fractures. Therefore, water infiltration from the rock can be variable, locally high, discontinuous and at variable levels.

The infiltrations of surface water runoff and the existing groundwater must be drained away from the construction areas by a method adapted for the subsurface conditions encountered at the site to assure the stability of the excavation slopes and to keep the bottom of excavation dry and stable over a sufficient depth that would allow construction.

5.2.4 Management of Excavated Material

The management of the excavated material on the construction site and/or its disposal off the site must be performed in accordance with the laws and environmental requirements in effect.

5.3 TRANSITIONS

At the intersection of material of different nature and/or frost-susceptibility, transitions must be planned. The required slopes should be performed until the frost line.

The longitudinal transitions to be performed in frost-susceptible soils and weathered or fracture rock are 20.0 horizontal for 1.0 vertical in new roads. However, with the engineer approbation, longitudinal transitions of 3.0 horizontal for 1.0 vertical (speed of less than 60 km/h) or 5.0 horizontal for 1.0 vertical (speed between 60 and 80 km/h) can be performed. For transversal transitions a slope of 3.0 horizontal for 1.0 vertical should be performed. In rock of better quality, transitions of 4.0 horizontal for 1.0 vertical should be used until a depth of 1.80 meters. For more details on recommended transitions, please refer to the Quebec's Ministry of Transportation standards.

At contact of an existing pavement structure and a new pavement structure, appropriate transitions should be practiced to prevent any differential behavior at these locations.

5.4 PAVEMENT STRUCTURE

The excavation should be realized as indicated in section 5.2.

The subgrade line has to be stable and solid. It has to be graded appropriately in order to obtain a perfectly drained surface (slope of 2% or more). Soft and/or unsuitable soils that may affect the behavior of the pavement will have to be excavated and replaced. **All the subgrade line should be inspected and approved by the geotechnician or is representative before building the pavement structure.** Afterward, the subgrade line has to be compacted to at least 95 % of the modified Proctor maximum dry density.

The pavement structures that we propose for the road take into account a maximum traffic of 4 900 vehicles northbound and 4 400 vehicles southbound every 24 hours. The structures presented in Table 7 correspond to the minimum recommended. **They consider a partial protection against the freezing effects; we must therefore expect pavement deformation. According to our evaluation carried out with the properties obtained from the sampled soils, the heaving due to freezing is not expected to exceed the permissible limit of 70 millimeters.**

It is mandatory to use an impregnating binder on the MG 20 base layer before laying down the base layer of the surface course.

Table 7 : Minimum pavement structures propose

Location	TF-01-11	TF-02-11 to TF-05-11	
Type of material	Thickness (mm)		Compaction Requirement
Subbase : MG 112 material	750	400[2]	95 % of the modified Proctor maximum dry density
Base : MG 20 crushed stone	300	300	[1]
Surface Course Base layer : GB-20 with PG58-34 bitumen Surface layer : ESG-10 with PG58-34 bitumen	 80 60	 80 60	 93 - 98 % of maximum density 93 - 98 % of maximum density

Notes: [1] Crushed gravel : 98 % of the modified Proctor maximum dry density / crushed stone : control strip

[2] In case of rock excavation, the excavation bottom is realized by leaving crushed rock in place on at least a 300 mm depth. This left in place crushed rock layer will act as the subbase. A geotextile membrane is required between the crushed rock and the MG 20 base material. The requirements for the transition should be respected between the base and the crushed rock layer.

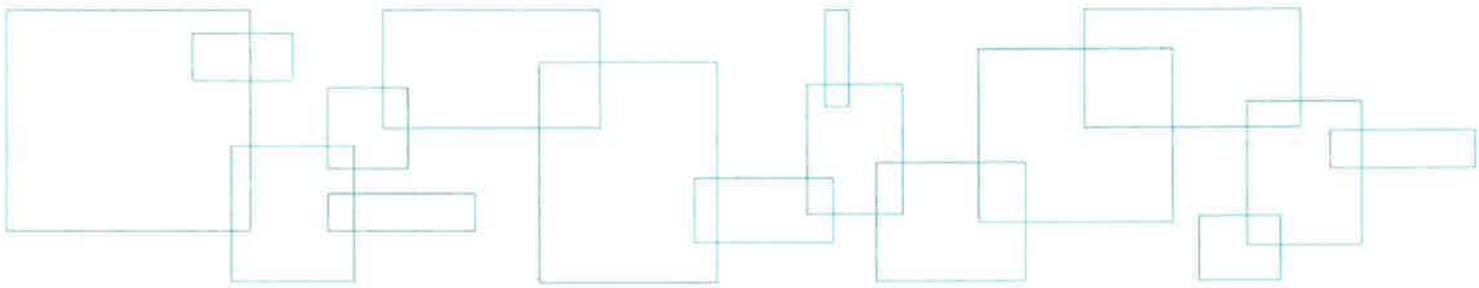
The classification refers to the « Cahier des Charges et Devis généraux et normes pour construction routière » from the Quebec's Ministry of Transportation.

On Gillmour Hill north side, we suggest using a draincotex system within the subgrade in order to collect infiltrating water and surface runoff water coming from higher ground.

The materials and construction should comply with requirements of the latest edition of the « Cahier des Charges et Devis généraux et aux normes – ouvrages routiers du ministère des Transports du Québec ».

It is important to note that those pavement structures are not designed to be used without surface course, the latter contributing significantly to the structural capacity. The subgrade materials as well as the subbase and base materials should be protected adequately in order to avoid any disturbance during construction.

Appendix 1 Scope of the Geotechnical Study



SCOPE OF THE GEOTECHNICAL STUDY

1.0 Characteristics of soil and rock

The soil and rock characteristics described in this report originate from geotechnical investigations conducted within a given period and correspond to the nature of the terrain only at the specific locations where these investigations were carried out.

Soil and rock formations have natural variations. The limits between the different formations presented in the sounding logs must therefore be considered as transitions between the formations rather than set boundaries. The precision of these limits depends on the type and number of soundings, the sounding methods used, as well as sampling frequency and methods.

The descriptions of the samples taken are based on recognized identification and classification methods used in geotechnics. They can call into play the judgement and interpretation of the personnel who carried out the examination of materials and can be presumed to be accurate and correct in keeping with current best practices in the field of geotechnics. Finally, if tests were carried out, the results of these tests apply solely to the samples tested, as described in this report.

The properties of the soil and rock can undergo significant modifications in the wake of construction activities such as excavation, blasting, pile driving or drainage activities, carried out on the site under study or an adjacent site. They can also be indirectly modified by the exposure of the soil or rock to freezing or weather stresses.

2.0 Groundwater

The groundwater conditions presented in this report apply only to the site under study. The accuracy and representation of these conditions must be interpreted based on the type of instrumentation used, as well as the period, duration, and number of observations carried out. These conditions can vary depending on precipitation, the seasons and, ultimately, the tides. They can also vary as a result of construction activities or the modification of physical elements on the site under study or in its vicinity. The problematic of ferrous ochre and its effects is not covered in this report.

3.0 Use of the report

The comments and recommendations contained in this report are intended primarily for the project's design team. The number of soundings required to identify all of the underground conditions that could impact construction costs, techniques, the choice of equipment and planning of operations could be greater than the number required for design purposes. All contractors bidding on or carrying out the work on the site under study must undertake their own interpretation of the results of the soundings and, if need be, carry out their own investigations to determine how site conditions could influence their operations or work methods.

Any modifications to the design, position and elevation of the works must be quickly communicated to LVM, allowing the validity of the recommendations presented to be verified. Complementary site or laboratory work could ultimately be required.

4.0 Project tracking

The interpretation of the on-site and laboratory results obtained, as well as the recommendations presented in this report, apply solely to the site under study and to the information available about the project at the time this report was drafted.

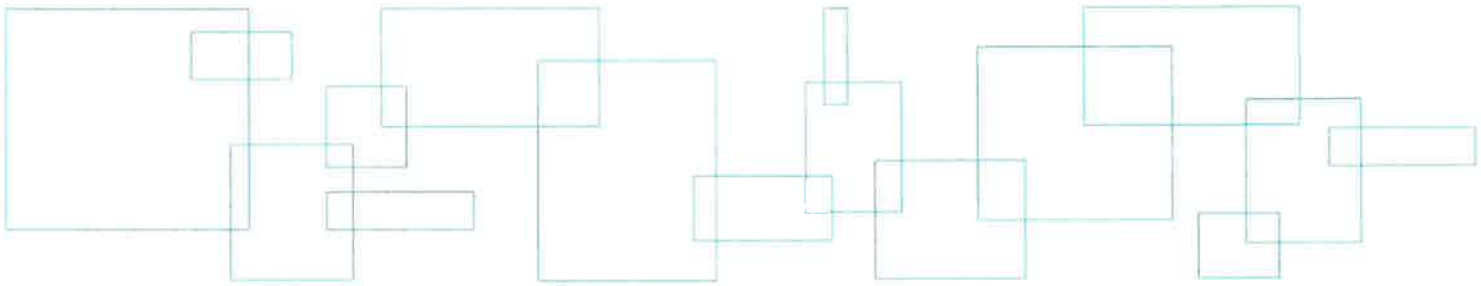
Information available concerning the site and groundwater conditions increases as construction work progresses. As site conditions were interpreted and correlated between sounding points, LVM should be allowed to verify these conditions, during site visits conducted as work progresses, in order to confirm the information provided by the drillings soundings. If it is not possible for us to conduct these verifications, LVM shall assume no responsibility for geotechnical interpretations by third parties concerning recommendations contained in this report, particularly if the design has been modified or if site conditions different from those described in this report are encountered. The identification of such changes requires experience and must be carried out by a experienced geotechnical engineer.

5.0 Environment

The information contained in this report does not cover the environmental aspects of the site conditions, as these aspects were not included in the study mandate.

Appendix 2

Explanation Note on Sounding Logs and Borehole Reports



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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

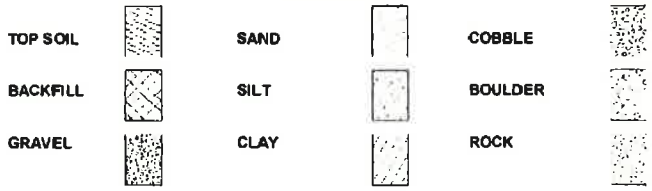
Consistency of cohesive soils	Undrained shear strength (kPa)
Very soft	< 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	> 200

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 :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-01-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183830.0 (Y)
East 248846.0 (X)
Elevation (Z)
Bedrock: 0.35 m End depth: 1.88 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
AS	Auger
MA	Bulk sample
TU	Transparent tube
PW	LVM Mega-Sampler
FG	Frozen ground

Tests

L	Consistency Limits	O.M.	Organic Matter (%)
W_L	Liquid Limit (%)	K	Permeability (cm/s)
W_P	Plastic Limit (%)	UW	Unit Weight (kN/m³)
I_P	Plasticity Index (%)	A	Absorption (l/min. m)
I_L	Liquidity Index	U	Uniaxial Compressive strength (MPa)
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_o	Segregation Potential (mm²/H °C)

▼	Water Level
N	Std Penetration test (blows/300mm)
N_C	Dyn. Penetration test (blows/300mm) ●
σ'_P	Preconsolidation Pressure (kPa)
SCI	Soil Corrosivity Index

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													
		0.00 / -0.15	Asphalt.												
1		0.15 / -0.35	Fill : gray rock particles mixed with sand.				A								GS W = 2.2
2		0.35	The particle size of the material consists of sandy gravel with traces of silt.			PW-1	B			92					
3	1		Brown weathered rock similar to a soil. The particule size of CF-2 sample is a clayey silt with traces of sand and traces of gravel. Presence of traces of organic matter and roots on the surface.												
4						CF-2			B	74	4-6 8-9	14			GS L W = 24.3
5															
6		-1.88				CF-3			B	100	5-22 50 / 5 cm	R			
7	2	1.88	End of sounding at the auger refusal at a depth of 1.88 m.												
8															
9															
10	3														
11															

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

Remarks: No water was noted in the observation tube on July 15, 2011.

Borehole type: **Auger sampler hole**

Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**

Approved by: **J. Dostie, ing.**

2014-02-05

Page: 1 of 1

Vertical Scale = 1 29

LVM

Client :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-02-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183780.0 (Y)
East 248784.0 (X)
Elevation (Z)
Bedrock: 0.35 m End depth: 0.83 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
AS	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	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
		0.00														NATURAL WATER CONTENT AND LIMITS (%) Wp W WL; 20 40 60 80 100 120
		0.00 / -0.15	Asphalt.													UNDRAINED SHEAR STRENGTH (kPa) OR DYNAMIC PENETRATION; 20 40 60 80 100 120
1		0.15 / -0.35	Fill : gray rock particles mixed with sand.				A									
2		0.35 / -0.83	Gray weathered and fractured rock.		Tel. -0.79 m 2011-07-15	PW-1	B			79						
3	1	0.83	End of sounding at the auger refusal at a depth of 0.83 m.			CF-2				0	50 /0 cm	R				
4																
5																
6																
7	2															
8																
9																
10	3															
11																

Vertical Scale = 1 : 29

Remarks:

Borehole type: **Auger sampler hole**

Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**

Approved by: **J. Dostie, ing.**

2014-02-05

Page: 1 of 1

LVM

Client :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-03-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183742.0 (Y)
East 248713.0 (X)
Elevation (Z)
Bedrock: 0.62 m End depth: 6.22 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
AS	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_f	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													
		0.00	Asphalt.												
		-0.12													
		0.12	Fill : Gray crushed stone of apparent type MG 20. The particle size of the material consists of a sand and gravel with traces of silt.			PW-1	A			86					GS W = 3,3
		-0.62					B								
		0.62	Gray weathered and fractured rock.		el. -1.63 m 2011-07-15	CF-2			B	74	7-11 9-11	20			
						CF-3			B	74	7-11 9-30	20			
						CF-4			B	58	50 /13 cm	R			
		-2.74													
		2.74	Rock : gray argillaceous limestone of very poor quality.			CR-5			NQ	65		16			

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 : 29

Remarks:

Borehole type: **Auger sampler hole**

Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**

Approved by: **J. Dostie, ing.**

2014-02-05

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Client :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-03-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183742.0 (Y)
East 248713.0 (X)
Elevation (Z)
Bedrock: 0.62 m End depth: 6.22 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	FIELD AND LABORATORY TESTS: 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
12			Rock : gray argillaceous limestone of very poor quality.			CR-6			NQ	65		0				
13	4	-4.18														
		4.18	Rock : gray argillaceous limestone of poor to good quality.													
14																
15																
16	5					CR-7			NQ	100		44				
17																
18																
19						CR-8			NQ	100		85				
20	6	-6.22														
		6.22	End of sounding at a depth of 6.22 m.													
21																
22																
23	7															
24																
25																
26	8															
27																
28																

Vertical Scale = 1 : 29

Remarks:

Borehole type: **Auger sampler hole**

Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**

Approved by: **J. Dostie, ing.**

2014-02-05

Client :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-04-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183688.0 (Y)
East 248667.0 (X)
Elevation (Z)
Bedrock: 0.56 m End depth: 5.18 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
AS	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_I	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													
		0.00	Asphalt.												
		-0.17													
		0.17	Fill: Gray crushed stone of apparent type MG 20. The particle size of the material consists of sand and gravel with traces of silt.												GS W = 3.1
1		-0.56					A								
2	1	0.56	Greenish brown to gray weathered rock, similar to a soil.			PW-1	B			95					
3															
4						CF-2			B	66	5-10 5-5	15			
5															
6						CF-3			B	74	6-5 6-15	11			
7	2														
8						CF-4			B	41	8-8 8-12	16			
9		-2.74													
		2.74	Greenish brown to gray weathered to friable rock.												
10	3					CF-5			B	74	12-21 26-17	47			
11															

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

Remarks:

Borehole type: **Auger sampler hole**
Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**
Approved by: **J. Dostie, ing.**
2014-02-05
Page: 1 of 2

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Client :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-04-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183688.0 (Y)
East 248667.0 (X)
Elevation (Z)
Bedrock: 0.56 m End depth: 5.18 m

DEPTH - ft	DEPTH - m	STRATIGRAPHY: 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	FIELD AND LABORATORY TESTS: RESULTS	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
12			Greenish brown to gray weathred to friable rock.													
13	4															
14																
15																
16	5				el. -4.97 m 2011-07-15	CF-6			B	82	10-15 30-30	45				
17		-5.18														
		5.18	End of sounding at a depth of 5.18 m.													
18																
19																
20	6															
21																
22																
23	7															
24																
25																
26	8															
27																
28																

Vertical Scale = 1 : 29

Remarks:

Borehole type: **Auger sampler hole**

Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**

Approved by: **J. Dostie, ing.**

2014-02-05

LVM

Client :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-05-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183619.0 (Y)
East 248687.0 (X)
Elevation (Z)
Bedrock: 3.05 m End depth: 4.57 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
AS	Auger
MA	Bulk sample
TU	Transparent tube
PW	LVM Mega-Sampler
FG	Frozen ground

Tests

L	Consistency Limits	O.M.	Organic Matter (%)
W_L	Liquid Limit (%)	K	Permeability (cm/s)
W_P	Plastic Limit (%)	UW	Unit Weight (kN/m³)
I_P	Plasticity Index (%)	A	Absorption (l/min. m)
I_L	Liquidity Index	U	Uniaxial Compressive strength (MPa)
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_T	Modulus of subgrade reaction (MPa)
WR	Weight of Rods	SP_O	Segregation Potential (mm²/H °C)

▼ Water Level
N Std Penetration test (blows/300mm)
N_C Dyn. Penetration test (blows/300mm) ●
σ'_P Preconsolidation Pressure (kPa)
SCI Soil Corrosivity Index

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

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	Asphalt.												
		-0.10	Fill : crushed stone of apparent type MG 20, mixed with brown sand.												
1		0.10 / -0.35					A								
		0.35	Fill : crushed stone of apparent type MG 56, mixed with brown sand.			PW-1	B								GS W = 2.7
2			The particle size of the material consists of gravel and sand with traces of silt.				C								
		-0.81 / 0.81	Fill : brown sand with traces of silt and traces of gravel.												
3	1														
4						CF-2			B	49	7-12 / 8-4	20			
		-1.52													
5		1.52	Gray sand with some silt, traces of clay and traces of gravel. Presence of sand beds, organic matter and particles of decomposed wood.												
6						CF-3			B	90	4-4 / 5-4	9			GS L W = 25.1
	2	-2.13													
7		2.13	Gray sand with some silt to silty sand and traces of gravel, wet to saturated. Presence of traces of organic matter.												
8						CF-4			B	41	4-4 / 5-4	9			
9							A								
10	3	-3.05				CF-5			B	63	1-0 / 31-50 / 10 cm	R			
		3.05	Greenish gray weathred rock, similar to a soil. Presence of traces of organic matters on the surface.				B								
11															

el. -0.37 m 2011-07-15

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

Remarks:

Borehole type: **Auger sampler hole**

Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**

Approved by: **J. Dostie, ing.**

2014-02-05

Page: 1 of 2

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Client :

Public Works and Government Services Canada

BOREHOLE REPORT

File n°: **P033959-0109**
Borehole n°: **TF-05-11**
Date: **2011-07-04**

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain**

Location: **Quebec**

Coordinates (m): North 5183619.0 (Y)
East 248687.0 (X)
Elevation (Z)
Bedrock: 3.05 m End depth: 4.57 m

DEPTH - ft	DEPTH - m	STRATIGRAPHY: 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	FIELD AND LABORATORY TESTS: RESULTS	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
12			Greenish gray weathered rock, similar to a soil.													
13	4															
14																
		-4.57														
15		**4.57**	End of sounding at 4.57 deep.													
16																
	5															
17																
18																
19																
	6															
20																
21																
22																
23	7															
24																
25																
26	8															
27																
28																

Vertical Scale = 1 : 29

Remarks:

Borehole type: **Auger sampler hole**

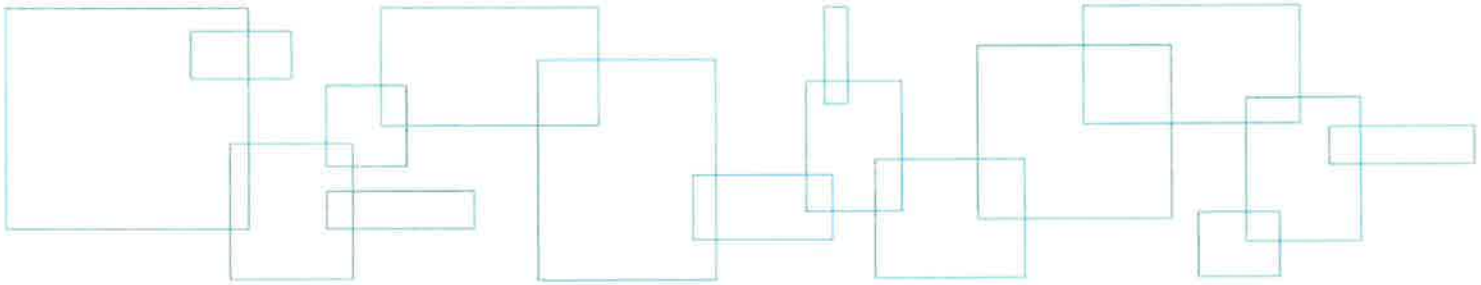
Boring equipment: **UM-2008**

Prepared by: **G. Meunier, tech.**

Approved by: **J. Dostie, ing.**

2014-02-05

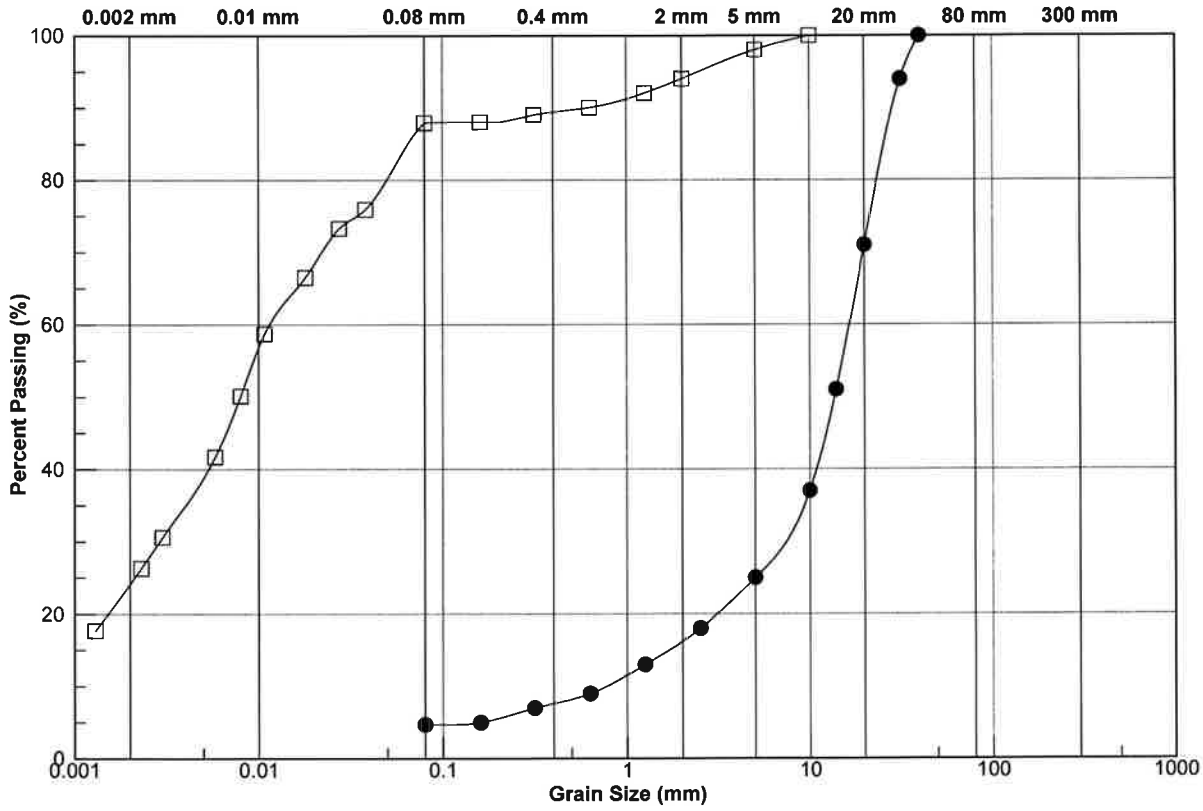
Appendix 3 Laboratory Tests Results



GRAIN-SIZE ANALYSIS

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain** Figure n° : **1**

Location: **Quebec** File n° : **P033959-0109**



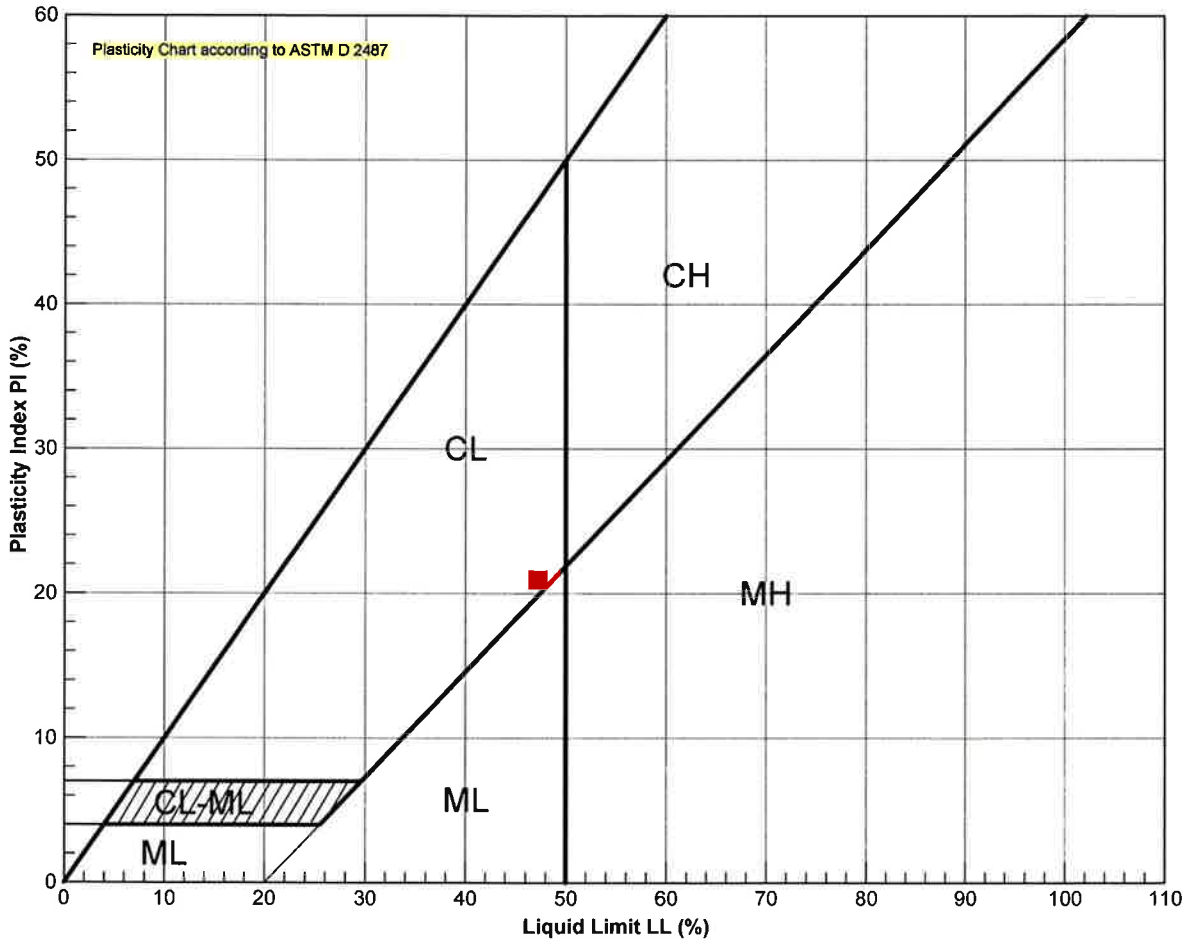
CLAY	SILT	SAND			GRAVEL		COBBLE	BOULDER
		FINE	MEDIUM	COARSE	FINE	COARSE		

Col. symboles	Borehole n°	Sample n°	Depth (m)	Description	USCS class. (ASTM D-2487)
●	TF-01-11	PW-1A	0.15 - 0.35	Sandy gravel with traces of silt.	GP-GM
□	TF-01-11	CF-2	0.91 - 1.52	Clayey silt with traces of sand and traces of gravel.	CL

PLASTICITY CHART

Project : **Gilmour Hill, road section between avenue de Laune and boulevard Champlain** Figure n° : **2**

Location: **Quebec** File n° : **P033959-0109**

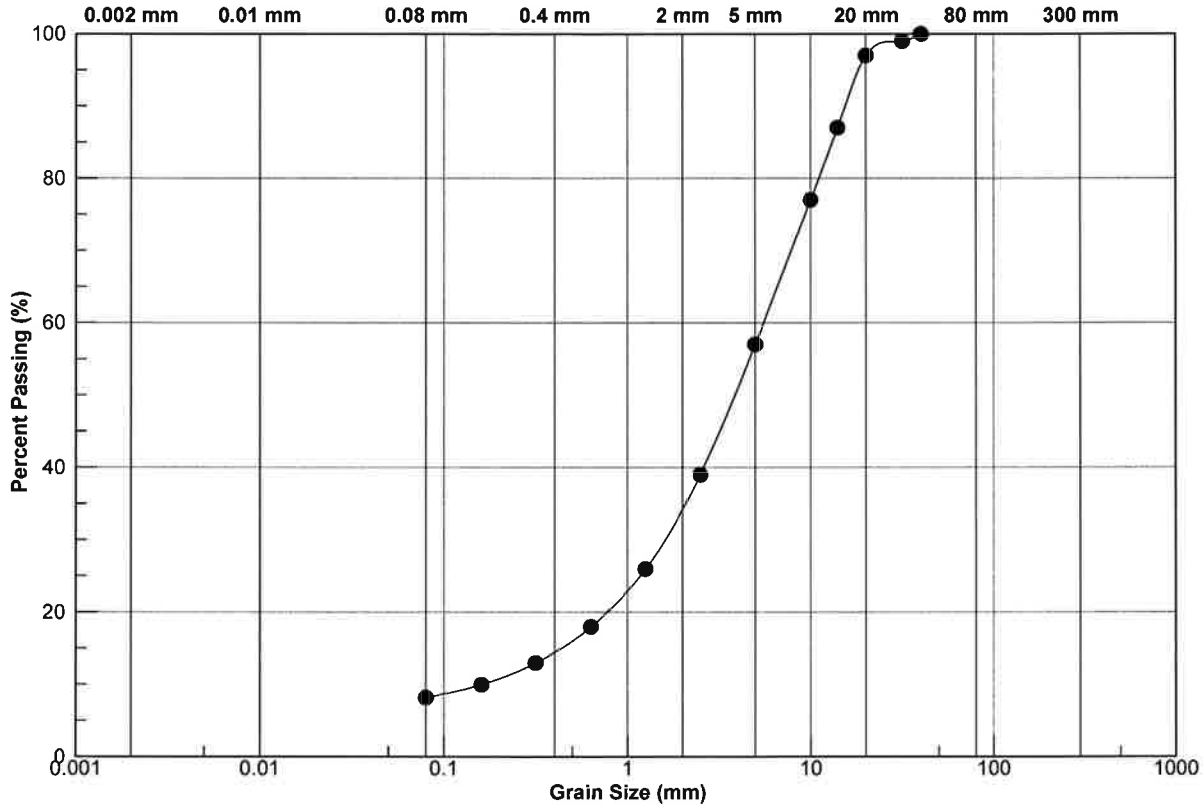


Symbol	Borehole n°	Sample n°	Depth (m)	W	L_L	P_L	P_I	L_L	USCS Class.
■	TF-01-11	CF-2	0.91 - 1.52	24.3	47.2	26.3	21	-0.1	CL

GRAIN-SIZE ANALYSIS

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain** Figure n° : **3**

Location: **Quebec** File n° : **P033959-0109**



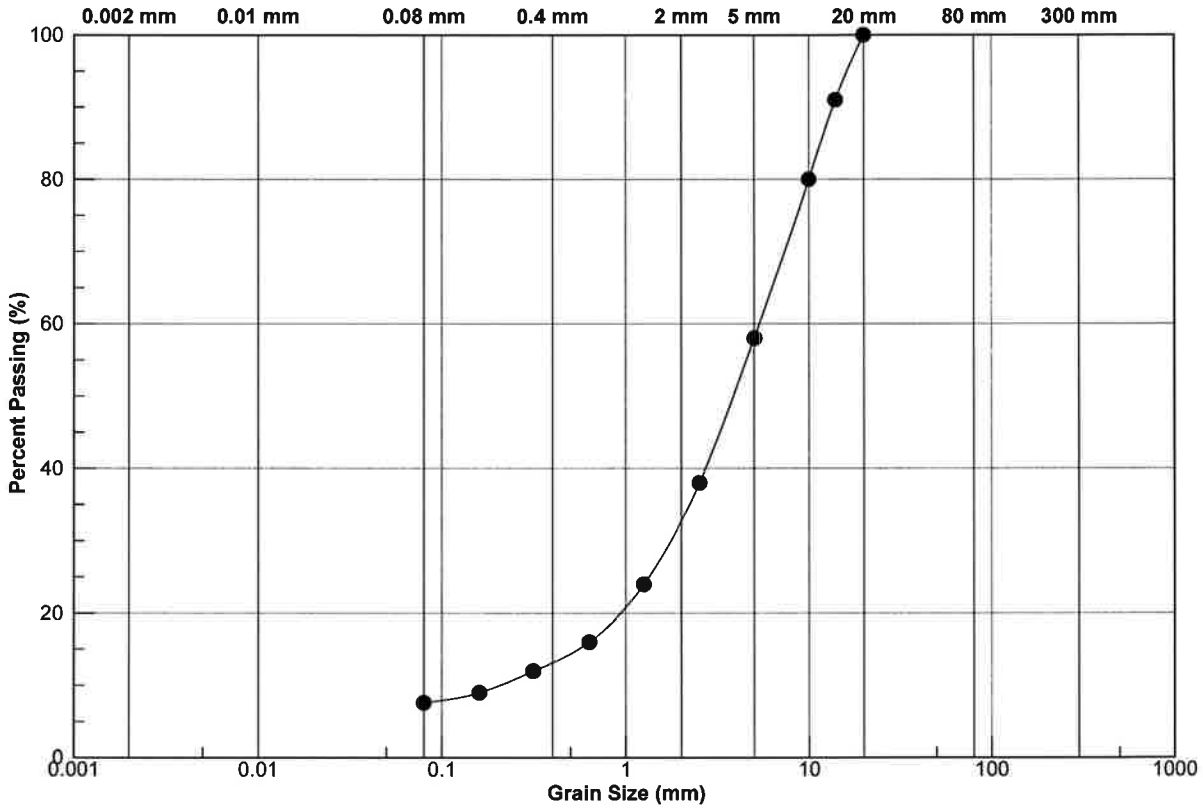
CLAY	SILT	SAND			GRAVEL		COBBLE	BOULDER
		FINE	MEDIUM	COARSE	FINE	COARSE		

Col. symboles	Borehole n°	Sample n°	Depth (m)	Description	USCS class. (ASTM D-2487)
—●—	TF-03-11	PW-1A	0.12 - 0.62	Sand and gravel with traces of silt.	SW-SM

GRAIN-SIZE ANALYSIS

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain** Figure n° : **4**

Location: **Quebec** File n° : **P033959-0109**



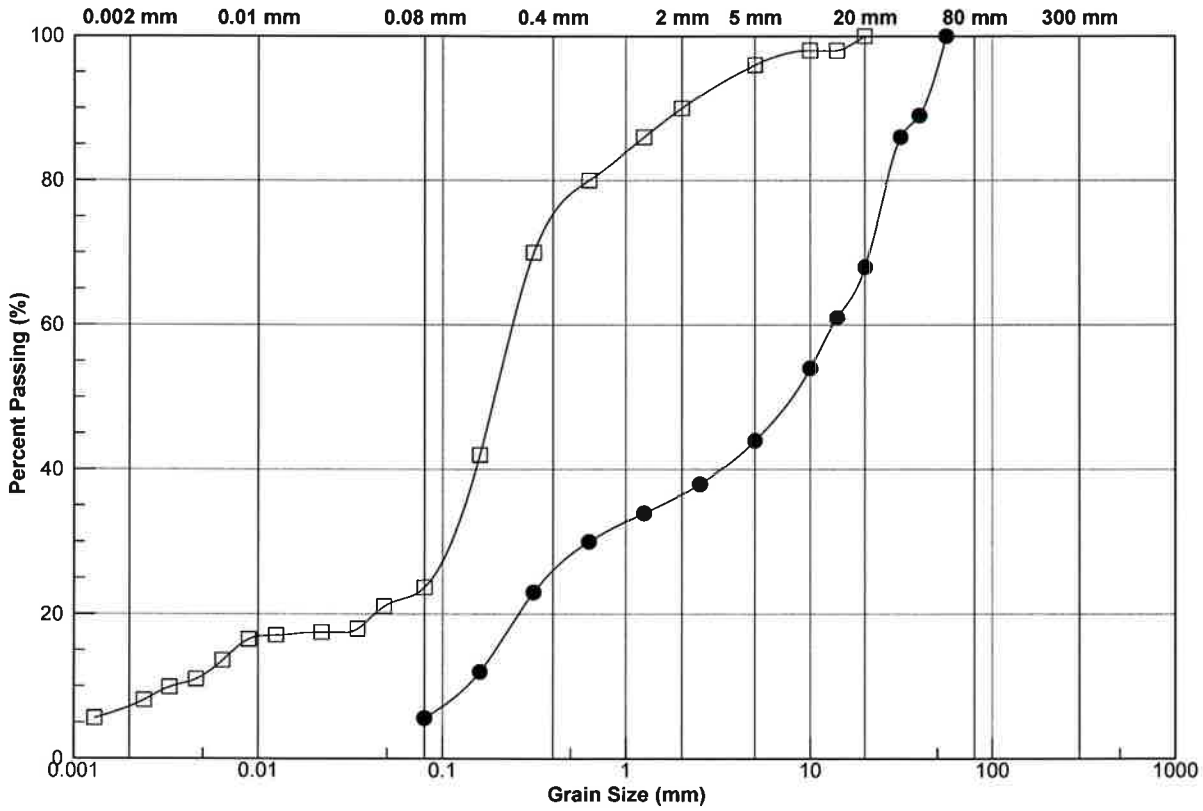
CLAY	SILT	SAND			GRAVEL		COBBLE	BOULDER
		FINE	MEDIUM	COARSE	FINE	COARSE		

Col. symboles	Borehole n°	Sample n°	Depth (m)	Description	USCS class. (ASTM D-2487)
—●—	TF-04-11	PW-1A	0.17 - 0.56	Sand and gravel with traces of silt.	SW-SM

GRAIN-SIZE ANALYSIS

Project: **Gilmour Hill, road section between avenue de Laune and boulevard Champlain** Figure n° : **5**

Location: **Quebec** File n° : **P033959-0109**



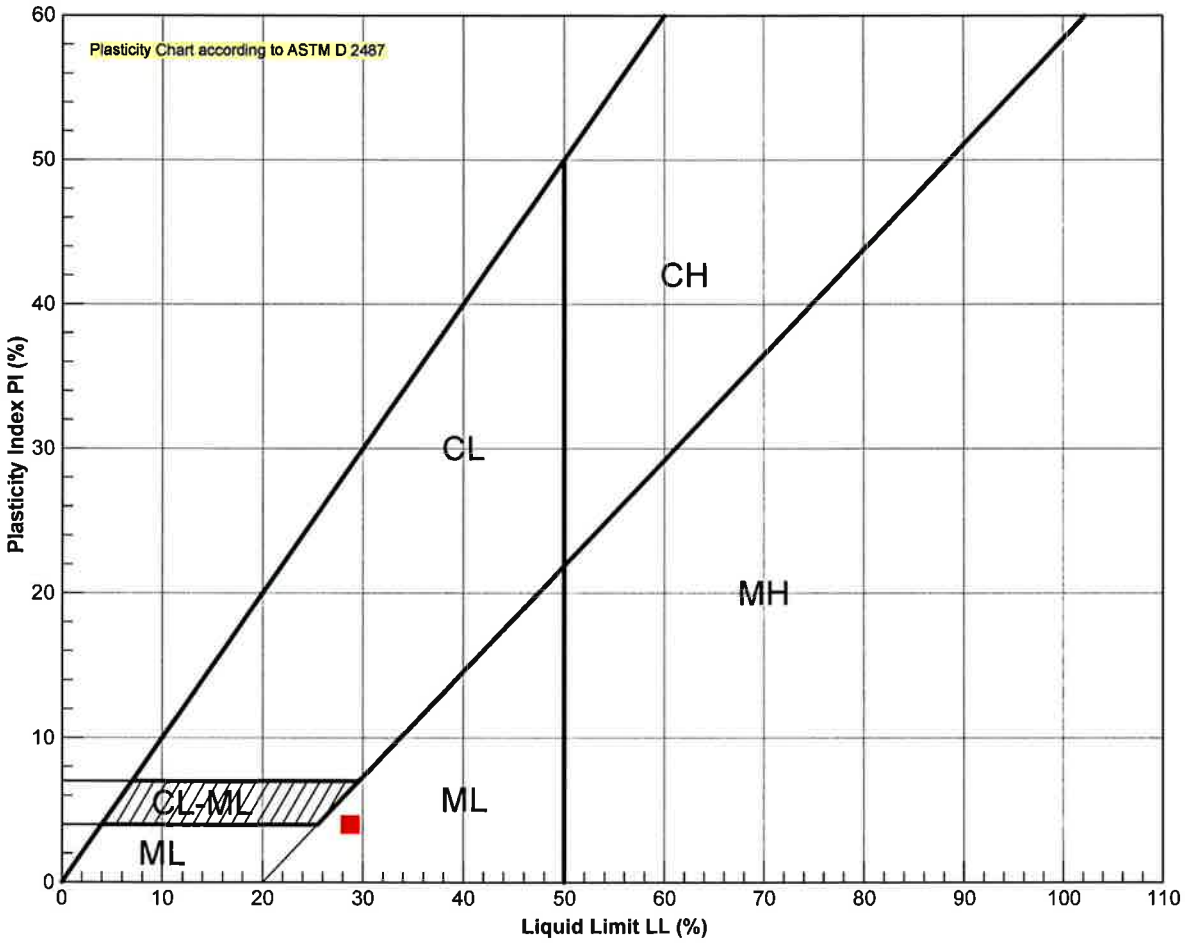
CLAY	SILT	SAND			GRAVEL		COBBLE	BOULDER
		FINE	MEDIUM	COARSE	FINE	COARSE		

Col. symboles	Borehole n°	Sample n°	Depth (m)	Description	USCS class. (ASTM D-2487)
●—	TF-05-11	PW-1B	0.35 - 0.81	Gravel and sand with traces of silt.	GP-GM
□—	TF-05-11	CF-3	1.52 - 2.13	Sand with some silt, traces of clay and traces of gravel.	SM

PLASTICITY CHART

Project : **Gilmour Hill, road section between avenue de Laune and boulevard Champlain** Figure n° : **6**

Location: **Quebec** File n° : **P033959-0109**



Symbol	Borehole n°	Sample n°	Depth (m)	W	L_L	P_L	P_I	L_L	USCS Class.
■	TF-05-11	CF-3	1.52 - 2.13	25.1	28.8	24.8	4	0.1	ML

Appendix 4 Photographs

PHOTOGRAPH No. 1: Drilling rig at borehole TF-01-11 location.

PHOTOGRAPH No. 2: Drilling rig at borehole TF-02-11 location.

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PHOTOGRAPH No. 3: Drilling rig at borehole TF-03-11 location.

PHOTOGRAPH No. 4: Drilling rig at borehole TF-04-11 location.

PHOTOGRAPH No. 5: Drilling rig at borehole TF-05-11 location.

PHOTOGRAPH No. 6: Rock core recovered from borehole TF-03-11 (CR-5 to CR-8).

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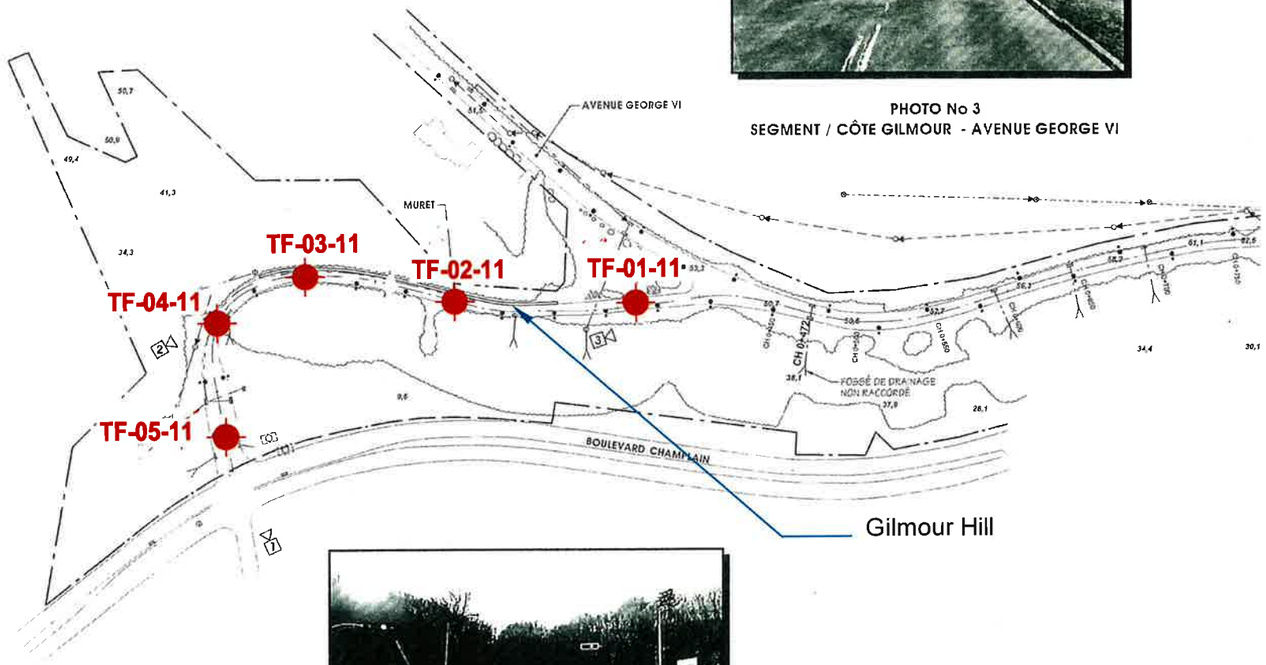
Appendix 5 Borehole Location Plan

PHOTO No 2
SEGMENT / CÔTE GILMOUR

PHOTO No 3
SEGMENT / CÔTE GILMOUR - AVENUE GEORGE VI



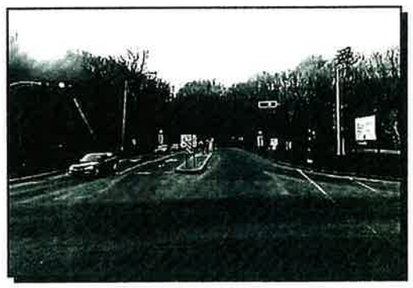


PHOTO No 1
SEGMENT / CÔTE GILMOUR
- BOULEVARD CHAMPLAIN

LEGEND :

TF-01-11 Borehole no TF-01-11

NOTES:
1-REFERENCE: DRAWING WAS PROVIDED TO US BY THE CUSTOMER AND IS ONLY FOR LOCATION SURVEYS.
2-THE SURVEYS WERE CONDUCTED IN THE MIDDLE OF THE STREET AND A DISTANCE OF 81.50 M CENTER TO CENTER SEPARATES EACH SURVEY EXCEPT THE DISTANCE BETWEEN HOLES TF-04-11 AND TF-05-11 WHICH IS OF 83,60 METERS.
3-THE LOCATION SURVEYS ON THE PLAN IS APPROXIMATE.

REV.	Y - M - D DATE	DESCRIPTION	Prepared By	Checked By
00	14-02-03	ISSUED FOR GEOTECHNICAL REPORT	J.D.	G.L.

ISSUES / REVISIONS

ALL DIMENSIONS MUST BE TAKEN AND CHECKED BEFORE BEGINNING THE WORKS

Seal

Client

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Client's references

Project

GILMOUR HILL, ROAD SECTION BETWEEN AVENUE DE LAUNE AND BOULEVARD CHAMPLAIN

QUEBEC

Title

GEOTECHNICAL STUDY
APPROXIMATE LOCATION OF SOUNDING

LVM inc.
325, de l'Espinay Street
Québec (Québec) G1L 2J2
Phone : 418.647.1402
Fax : 418.648.9288

Prepared	J. Dostie	Discipline	GEOTECHNIC
Drawn	P. Pelletier	Scale	NO SCALE
Checked	G. Lemieux	Date	JANUARY 2014
Project Manager	J. Dostie	Sequence No.	01 of 01

M. dept.	Project	Work pckg.	Sub-w.p.	Disc.	Drawing No.	Rev.
072	P033959	0109		GE	0001	00

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