TECHNICAL SPECIFICATION – REV.1

CSC Automatic Sprinkler Systems Upgrade
244, Montée Gagnon, SADP, QC

RE-ISSUED FOR TENDER

Signature numérique de Georges Salameh
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Section 01 00 50 – General Instructions

1.0 GENERAL INSTRUCTIONS

1.1 REFERENCES

National Building Code of Canada (NBC) 2010, including all amendments up to the date of bid closing.

1.2 DESCRIPTION OF THE WORK

1. The project includes the following work. The list below is not necessarily exhaustive and in no way releases the Contractor from the obligation of carrying out the project in its entirety according to generally accepted practices as well as the intentions and general principles as described in these specifications and drawings.
   a. Supply and install fire protection and alrm detection systems;

1.3 SITE INSPECTION BY BIDDERS

1. For security reasons at the penitentiary, the site inspection shall be conducted at a set time that will be specified in the tender documents. The meeting place will be the main entrance of the institution concerned. The site inspection is mandatory.
2. The Contractor shall examine the site and conditions that could have an impact on the work prior to submitting his proposal. Submitting a bid indicates that the bidder accepts the terms and conditions of the solicitation and agrees to be bound by them.

1.4 SECURITY SCREENING

1. All workers shall undergo security screening in order to be granted a security classification as required by the Correctional Service of Canada and Public Works and Government Services Canada.
2. Section 01 35 13 provides a detailed description of the procedures involved in the security screening.
3. At the start of work, a job-site special meeting will be held with institution representatives to define the instructions governing security and site operation in a correctional environment.

1.5 CODES

1. The specifications will require that the work and materials comply with the National Building Code of Canada (NBC) and all other applicable provincial or local codes. The strictest requirements shall apply in case of contradiction or discrepancy.
2. The work shall be performed in a manner that meets or exceeds the following requirements:
   a. Contract documents
   b. Specified standards and codes as well as other documents cited as references

1.6 REQUIRED DOCUMENTS

A copy of the following documents shall be kept at the job site:

a. Contract drawings
b. Specifications
c. Amendments
d. Amended shop drawings
e. Modification orders
f. Other contract amendments
g. On-site test reports
h. Approved work schedule
i. Manufacturer installation and start-up instructions

1.7 SUBSOIL STUDY

A subsoil test report is available for consultation. If the contractor is not satisfied with the report, he can do some soil test to his own expense and include it in his bid.

1.8 WORK SCHEDULE

1. The successful bidder shall initiate work immediately upon receiving notice that the contract has been awarded. The work covered by this document, including measures to correct construction deficiencies, must be completed within the schedule specified herein. Failure to comply with the schedule shall be dealt with as provided for in the Standard Acquisition Clauses and Conditions (SACC) Manual, Public Works and Government Services Canada (PWGSC).
2. Within 10 business days of contract award, submit a work schedule for the various project phases and the completion date.
3. Within 10 business days of contract award, submit shop drawings, technical data sheets, samples, and security screening applications for approval.
4. The work sequence is as follows:
   a. Start-up meeting and schedule submission, shop drawings, technical data sheets, samples, and security screening applications for approval
   b. Approval of documents submitted
   c. Construction start-up
   d. Correction of deficiencies
   e. Final approval
5. Within ten (10) business days of contract award, the Contractor shall provide, in a format acceptable to the Project Manager, a work schedule indicating:

a. Dates for submitting shop drawings, lists of materials, and samples
b. Delivery dates for the following pieces of equipment and materials:
c. Start-up and completion dates for the work described in each section of the specifications
d. Final completion date with respect to the completion date stipulated in the contract documents

6. Changes to milestones in the submitted schedule shall be at the discretion of the CSC Project Manager. The schedule shall be updated by the Contractor with the cooperation and approval of the CSC Project Manager.
7. The following work shall be performed outside normal working hours.This work must be coordinated with the CSC Project Manager.

1.9 CONTRACTOR'S USE OF THE SITE

1. The institution must remain fully operational during construction. With this end in view, the CSC Project Manager or the institution's head of security can require the Contractor to halt work immediately on a temporary basis to prevent institution activities from being compromised.
2. Use of premises; limited access to the job site. Work and affected engineering structures outside the construction site must be carried out by a crew accompanied by an escort provided by CSC (see section 01 35 13).
3. The Contractor shall perform the work so as to disturb the occupants as little as possible and, to the degree possible, ensure that normal use can be made of the facilities. The Contractor shall also cooperate with the CSC Project Manager to facilitate performance of the work.
4. Existing services in the buildings must be maintained during the project.
5. No vehicle or mobile construction equipment shall remain on institution premises outside of working hours. All construction vehicles must be parked in the lot in front of the postern (main entrance). Refer to section 01 35 13.

1.10 NOISY ENVIRONMENT AND CELL-PHONE USE

1. No radios or "boom boxes" shall be tolerated at the job site.
2. Cell telephones are prohibited within the perimeter of the penitentiary.

1.11 PARKING AT THE SITE

The Contractor shall restrict parking to those areas authorized by the Institutional Head.

1.12 JOB-SITE MEETINGS

1. Job-site meetings shall be held at times and places subject to the approval of the CSC Project Manager.
2. All participants shall be informed of meetings being called.
3. The Engineer shall organize job-site meetings, set their dates and times, and ensure that minutes are drafted and distributed.

1.13 CONSTRUCTION STAKING

1. The elevations shall be established and the site fully staked based on control points and elevations indicated on the plans and in the specifications.
2. The Contractor shall assume full responsibility for staking the site and ensure complete implementation according to the location, lines, and grades indicated.
3. The Contractor shall provide the material required for staking.
4. The Contractor shall provide the materials required, such as rules and models, to facilitate the Engineer's work when inspecting staking work.
5. The Contractor shall provide stakes and the like required to carry out staking work.

1.14 LOCATION OF EQUIPMENT AND VARIOUS PIECES OF EQUIPMENT

1. The location of various devices and pieces of equipment as well as the electrical outlets indicated on the drawings and in the specifications must be considered approximate.
2. The Contractor shall install equipment and devices as well as distribution networks so as to limit hindrances and keep the largest amount of useful space possible while complying with manufacturer recommendations related to safety, access, and maintenance.
3. The Contractor shall inform the Project Manager of the installation date and request approval for the designated location.
4. When so requested by the Project Manager, the Contractor shall provide location plans indicating the relative positions of equipment and networks.

1.15 CONCEALED WORK

Unless indicated otherwise, pipes, conduits, ducts, and wiring in floors, walls, and ceilings in finished areas shall be concealed.

1.16 DRILLING AND SEALING

1. The Engineer's approval shall be obtained before cutting or drilling in bearing members or inserting sleeves.
2. Drilling and sealing shall be performed so as to ensure that connections are exact and with no play.
3. Holes and openings must be clean, straight, and smooth.
4. When the addition of a new structure requires modifications to an existing one, all required drilling, sealing, and other repairs shall be carried out to restore the existing structure to its condition prior to the work.

1.17 EXISTING SYSTEMS

1. When connections must be made to existing systems, the work shall be carried out at times determined by local authorities and performed so as to minimize disruption of pedestrian and vehicular traffic.
2. A work schedule shall be submitted to the CSC Project Manager for approval at least 48 hours prior to any existing services or system being interrupted. The approved schedule shall be followed; the individuals affected shall be informed beforehand.
3. Should installations be discovered during the course of work, the Engineer shall be immediately informed and a written report containing the observations provided to him.
4. All conduits for disused services within a radius of 2 m from any structure shall be removed. Conduits that have been cut shall be capped or otherwise plugged, as directed by the Engineer.
5. There shall be a record of the location of conduits that have been maintained in service, deviated, or abandoned.

1.18 MODIFICATIONS, ADDITIONS, OR RENOVATION OF EXISTING BUILDINGS

1. The Contractor shall perform the work so as to disturb the occupants as little as possible and, to the degree possible, ensure that normal use can be made of the facilities. The Contractor shall also cooperate with the CSC Project Manager to facilitate performance of the work.
2. At no time shall the safety measures be relaxed because of the work to be carried out under this contract. The Contractor shall take the steps required to ensure the level of safety required.
3. The Contractor shall use only those elevators, freight elevators, conveyors, and escalators reserved for his or her use to move materials and personnel. Before the Contractor uses an elevator, the cabin walls shall be protected as directed by the Engineer. The Contractor accepts liability for any damage to such devices, for their safe and proper use, and for any overloading of the existing equipment.

4. When work is to be carried out in occupied spaces, the Contractor shall provide and install whatever is required to protect the furnishings, equipment, and finish work; install dust barriers, partitions, and temporary notices; and clean the area at the end of each work day.

1.19 SUPPLEMENTAL DRAWINGS

The Engineer may provide supplemental drawings for clarification such supplemental drawings shall be considered to have the same meaning and scope as the contract documents.

1.20 REMAINS AND ANTIQUES

1. Remains, antiques, and other items of historical or scientific interest, such as cornerstones and their contents, commemorative plaques, and other objects bearing inscriptions discovered during the project.
2. The CSC Project Manager shall be informed immediately; authorization in writing is required before work can be resumed.
3. Remains, antiques, and other items of historical or scientific interest are the property of the Crown.

1.21 RESTRICTIONS RELATED TO TOBACCO USE

Restrictions regarding the use of tobacco inside buildings shall be complied with.

1.22 ASBESTOS

Removing sprayed or troweled-on asbestos can be a health risk. If, during the course of the work, the Contractor encounters materials that appear to be sprayed or troweled-on asbestos, he shall halt work and immediately inform CSC. Work shall not be resumed unless so authorized in writing by CSC.

1.23 OPERATING MANUAL

The Contractor shall submit, for approval, three (3) copies of an operating manual containing the following items:

- Table of contents
- List of suppliers and their contact information
- Warranties
- Approved shop drawings
- Operating and maintenance guides
- As-built drawings

1.24 PERSONNEL TRAINING

The Contractor shall provide two (2) periods of training:

- One for personnel in charge of systems maintenance and new installations
- One for system users

Section 01 33 00 – Submittal Procedures

1.0 GENERAL

1.1 ADMINISTRATIVE

1. Submit to CSC submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
2. Do not proceed with Work affected by submittal until review is complete.
3. Present shop drawings, product data, samples and mock-ups in SI Metric units.
4. Where items or information is not produced in SI Metric units converted values are acceptable.
5. Review submittals prior to submission to CSC. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
6. Notify CSC, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
7. Verify field measurements and affected adjacent Work are co-ordinated.
8. Contractor's responsibility for errors and omissions in submission is not relieved by CSC's review of submittals.
9. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by CSC review.
10. Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

1. The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
2. Submit drawings stamped and signed by professional engineer registered or licensed in Province of Canada.
3. Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

4. Allow 7 days for CSC's review of each submission.
5. Adjustments made on shop drawings by CSC are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to CSC prior to proceeding with Work.
6. Make changes in shop drawings as CSC may require, consistent with Contract Documents. When resubmitting, notify CSC in writing of revisions other than those requested.
7. Accompany submissions with transmittal letter, in duplicate, containing:
   a. Date.
   b. Project title and number.
   c. Contractor's name and address.
   d. Identification and quantity of each shop drawing, product data and sample.
   e. Other pertinent data.
8. Submissions include:
   a. Date and revision dates.
   b. Project title and number.
   c. Name and address of:
      - Subcontractor.
      - Supplier.
      - Manufacturer.
      - Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
      - Details of appropriate portions of Work as applicable:
        - Fabrication.
        - Layout, showing dimensions, including identified field dimensions, and clearances.
        - Setting or erection details.
        - Capacities.
        - Performance characteristics.
        - Standards.
        - Operating weight.
        - Wiring diagrams.
        - Single line and schematic diagrams.
        - Relationship to adjacent work.
9. After CSC's review, distribute copies.
10. Submit electronic copy of shop drawings for each requirement requested in specification Sections and as CSC may reasonably request.
11. Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by CSC where shop drawings will not be prepared due to standardized manufacture of product.

12. Submit electronic copies of test reports for requirements requested in specification Sections and as requested by CSC.
    a. Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
    b. Testing must have been within 3 years of date of contract award for project.
13. Submit electronic copies of certificates for requirements requested in specification Sections and as requested by CSC.
    a. Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
    b. Certificates must be dated after award of project contract complete with project name.
14. Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by CSC.
    a. Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
15. Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by CSC.
16. Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
17. Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by CSC.
18. Delete information not applicable to project.
19. Supplement standard information to provide details applicable to project.
20. If upon review by CSC, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 SAMPLES

1. Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
2. Deliver samples prepaid to CSC office.
3. Notify CSC in writing, at time of submission of deviations in samples from requirements of Contract Documents.
4. Where colour, pattern or texture is criterion, submit full range of samples.

5. Adjustments made on samples by CSC are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to CSC prior to proceeding with Work.
6. Make changes in samples which CSC may require, consistent with Contract Documents.
7. Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

1. Erect mock-ups in accordance with 01 45 00 - Quality Control.

Section 01 35 13 – Security CSC

1.0 SECURITY CSC

1.1 PURPOSE

To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

1.2 DEFINITIONS

1. "Contraband" means:
   a. an intoxicant, including alcoholic beverages, drugs and narcotics,
   b. a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization,
   c. an explosive or a bomb or a component thereof,
   d. currency over any applicable prescribed limit of 50$, and
   e. any item not described in paragraphs (a) to (d) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization
2. “Unauthorized Smoking Items” means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing or snuffing tobacco, cigarette making machines, matches and lighters.
3. "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.
4. "CSC" means Correctional Service Canada.
5. "Director" means Director or Warden of the Institution as applicable or their representative.
6. "Construction employees" means persons working for the general contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.
7. “Departmental Representative” means the Public Works and Government Services Canada (PWGSC) or the Correctional Service Canada (CSC) project manager depending on project.
8. "Perimeter" means the fenced or walled area of the institution that restrains the movement of the inmates.
9. "Construction zone" means the area as shown on the contract drawings where the contractor will be allowed to work. This area may or may not be isolated from the security area of the institution.

1.3 PRELIMINARY PROCEEDINGS

1. Prior to the commencement of work, the contractor shall meet with the Director to:
   a. Discuss the nature and extent of all activities involved in the Project.
   b. Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.
2. The contractor will:
   a. Ensure that all construction employees are aware of the CSC security requirements.
   b. Ensure that a copy of the CSC security requirements is always prominently on display at the job site.
   c. Co-operate with institutional personnel in ensuring that security requirements are observed by all construction employees.

1.4 CONSTRUCTION EMPLOYEES

1. Submit to the Director a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee.
2. Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC institutions are not valid at the institution where the project is taking place.
3. The Director may require that facial photographs may be taken of construction employees and these photographs may be displayed at appropriate locations in the institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the construction employees clothing at all time while employees are at the institution.
4. Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.
5. Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
   a. Appear to be under the influence of alcohol, drugs or narcotics.
   b. Behave in an unusual or disorderly manner.
   c. Are in possession of contraband.

1.5 VEHICLES

1. All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.
2. The director may limit at any time the number and type of vehicles allowed within the Institution.
3. Drivers of delivery vehicles for material required by the project shall not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or Commissionaires while in the Institution.
4. If the Director permits trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter must be locked when not in use.

1.6 PARKING

The parking area(s) to be used by construction employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.

1.7 SHIPMENTS

All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the institution's own shipments. The contractor must have his own employees on site to receive any deliveries or shipments. CSC staff will NOT accept receipt of deliveries or shipments of any material equipment or tools for the contractor.

1.8 TELEPHONES

1. There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the institution unless prior approval of the Director is received.
2. The Director will ensure that approved telephones, Facsimile machine and computers with Internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an Internet connection to unauthorized personnel.
3. Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the perimeter of the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.
4. The Director may approve but limit the use of two way radios.

1.9 WORK HOURS

1. Work hours within the Institution are: Monday to Friday regular during the day.
2. Work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waved by the Director.

1.10 OVERTIME WORK

1. No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such the completion of a concrete pour or work to make the construction safe and secure, the contractor shall advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to Canada for such events may be attributed to the contractor.
2. When overtime work, weekend statutory holiday work is required and approved by the Director, extra staff members may be posted by the Director or his designate, to maintain the security surveillance. The actual cost of this extra staff may be attributed to the contractor.

1.11 TOOLS AND EQUIPMENT

1. Maintain on site a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required.
2. Throughout the construction project maintain an up-to-date list of tools and equipment specified above.
3. Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.
4. Store all tools and equipment in approved secure locations.
5. Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the contractor.
6. Scaffolding shall be secured and locked when not erected and when erected, shall be secured in a manner agreed upon with the director.
7. All missing or lost tools or equipment shall be reported immediately to the Director.
8. The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
   a. At the beginning and conclusion of every construction project.
   b. Weekly, when the construction project extends longer than a one week period.

9. Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day.
10. If propane or natural gas is used for heating the construction, the institution will require that an employee of the contractor supervise the construction site during non-working hours.

1.12 KEYS

1. Security Hardware Keys
   a. The Contractor shall arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).
   b. The SMO will provide a receipt to the Contractor for security hardware keys.
   c. The contractor will provide a copy of the above-mentioned receipt to the Departmental Representative.
2. Other Keys
   a. The contractor will use standard construction cylinders for locks for his use during the construction period.
   b. The contractor will issue instructions to his employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.
   c. Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:
      - Prepare an operational keying schedule;
      - accept the operational keys and cylinders directly from the lock manufacturer;
      - Arrange for removal and return of the construction cores and install the operational core in all locks.
   d. Upon putting operational security keys into use, the CSC construction escort shall obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the CSC construction escort.

1.13 SECURITY HARDWARE

Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

1.14 PRESCRIPTION DRUGS

Employees of the contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.

1.15 SMOKING RESTRICTIONS

1. Contractors and construction employees are not permitted to smoke inside correctional facilities or outdoors within the perimeter of a correctional facility and must not possess unauthorized smoking items within the perimeter of a correctional facility.
2. Contractors and construction employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.
3. Smoking is only permitted outside the perimeter of a correctional facility in an area to be designated by the Director.

1.16 CONTRABAND

1. Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on institutional property.
2. The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Director.
3. Contractors should be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.
4. Presence of arms and ammunition in vehicles of contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

1.17 SEARCHES

1. All vehicles and persons entering institutional property may be subject to search.
2. When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of contraband or unauthorized items, he may order that person to be searched.
3. All employees entering the Institution may be subject to screening of personal effects for traces of contraband drug residue.

1.18 ACCESS TO AND REMOVAL FROM INSTITUTIONAL PROPERTY

Construction personnel and commercial vehicles will not be admitted to the institution after normal working hours, unless approved by the Director.

1.19 MOVEMENT OF VEHICLES

1. Escorted commercial vehicles will be allowed to enter or leave the institution through the vehicle access gate during the following hours:
   a. 07:45 a.m. to11:00 a.m.
   b. 1:00 p.m. to 3:30 p.m.

   Construction vehicles shall not leave the Institution until an inmate count is completed.
2. The contractor shall advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.
3. Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or Commissionaires working under the authority of the Director.
4. Commercial vehicles will only be allowed access to institutional property when their contents are certified by the Contractor or his representative as being strictly necessary to the execution of the construction project.
5. Vehicles shall be refused access to institutional property if, in the opinion of the Director, they contain any article which may jeopardize the security of the institution.
6. Private vehicles of construction employees will not be allowed within the security perimeter of medium or maximum security institutions without the authorization of the Director.
7. With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.
8. With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another fixed object.

1.20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

1. Subject to the requirements of good security, the Director will permit the Contractor and his employees as much freedom of action and movement as is possible.
2. However, notwithstanding paragraph above, the Director may:
   a. Prohibit or restrict access to any part of the institution.
   b. Require that in certain areas of the institution, either during the entire construction project or at certain intervals, construction employees only be allowed access when escorted by a member of the CSC security staff or a commissionaire.
3. During the lunch and coffee/health breaks, all construction employees will remain within the construction site. Construction employees are not permitted to eat in the officer's lounge or the dining room of the institution.

1.21 SURVEILLANCE AND INSPECTION

1. Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.
2. CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the construction project.

1.22 STOPPAGE OF WORK

The director may order at any time that the contractor, his employees, sub-contractors and their employees to not enter or to leave the work site immediately due to a security situation occurring within the Institution. The contractor's site supervisor shall note the name of the CSC staff member giving this instruction, the time of the request and obey the order as quickly as possible.

The contractor shall advise the Departmental Representative of this interruption of the work within 24 hours.

1.23 CONTACT WITH INMATES

1. Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any construction employee doing any of the above will be removed from the site and his security clearance revoked.
2. It is to be noted that cameras are not allowed on CSC property.
3. Notwithstanding the above paragraph, if the director approves of the usage of cameras, it is strictly forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this contract.

1.24 COMPLETION OF CONSTRUCTION PROJECT

Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

Section 01 35 30 – Health and Security Specification

1.0 PART 1 - GENERAL

1.1 CONTENT

The general contractor must make sure that during his activities, the public and his employees' health and safety and the protection of the environment will always prevail on cost or schedule issues.

1.2 REFERENCES

1. Working Canadian code, part II, Canada Occupational Safety and Health Regulations.
2. Canadian Standard Association (CSA).
3. Workplace Hazardous Materials Information System (SIMDUT) /Health Canada.
   a. Data sheet.
4. Act respecting Occupational health and safety, L.R.Q. Chapitre S-2.12002.
5. Safety Code for the construction industry, S-2.1, r.6 2001.

1.3 DOCUMENTS/SAMPLES

1. Submit all documents and samples in conformity with the section 01 00 50 – General instructions.
2. 10 days before construction start, transmit to the CSC representative and to the Commission de la santé et de la sécurité du travail (CSST) the health and safety program specific to the construction activity as described in the section 1.8. If necessary, the general contractor must update his prevention program to reflect any changes to the initial plans. Following the reception of the prevention program and at any time during the work, the CSC representative can ask for its modification to adapt it to the work on site. The general contractor will have to proceed with the required modifications before work start.
3. Transmit to the CSC representative a copy of any federal or provincial inspector's inspection reports, notice of corrections or recommendations within 24 hours of their reception.
4. Transmit to the CSC representative any investigation report concerning any accident with injury or pointing out any potential hazard for health and safety within 24 hours of their reception.
5. Transmit to the CSC representative the data sheet for all controlled product at least three (3) days before they are used on site.
6. Transmit to the CSC representative a copy of the formation certificates required for the application of the prevention program including :
   a. General health and safety course on work sites;
   b. Security agent certificate;
   c. First-aid and CPR on work sites;

d. Work subject to asbestos conditions;
e. Work in enclosed spaces;
f. Locking/securing procedures;
g. Wearing and adjustment of individual protection equipments;
h. Forklift truck safe use;
i. Working platform lift;
j. and any other formation required by regulations or by the prevention program.

7. Medical examinations : when required by law, regulation, directive, specification or by a prevention program, the general contractor must :
   a. Before mobilisation, transmit to the CSC representative the medical examination certificate for all surveillance employees and any other employee attending the first site meeting concerned by this article's first paragraph.
   b. Afterwards, transmit as one goes along and without any delays all medical examination certificates of any new incoming worker concerned by this article's first paragraph.
8. Emergency plan: the emergency plan, as described in the article 1.7.3, must be transmitted to the CSC representative with the prevention program.
9. Notice of work start: the notice of work start must be transmitted to Commission de la santé et de la sécurité du travail before the work start and copied to the CSC representative. A copy of this notice must be available and visible on site at all time. During demobilisation, the notice of end of work must be transmitted to the CSST with a copy to the CSC representative.
10. Engineer's plans and notice of conformity: the general contractor must transmit to the CSST and to the CSC representative an engineer' signed and sealed copy of all the plans and notice of conformity required in virtue of the Safety Code for the construction industry (S-2.1, r. 6), of any other law, rules or any clause from the specifications or the contract. A copy of those documents must be available at all time on the work site.
11. Certificate of conformity delivered by the CSST : the certificate of conformity is a document delivered by the CSST and confirms that the general contractor complies with the CSST requirements, that he has paid all amount due in relation with the awarded contract. This document must be transmitted to the CSC representative at the end of work.

1.4 EVALUATION OF THE RISKS

1. The general contractor must identify all related risks to the various tasks on site.
2. The general contractormust plan and organize his work in order to favour the elimination of the danger at the source or the collective protection and minimize the use of individual protection equipments. When the use of individual protection equipment is required in situations of falling hazards, the workers must use a safety harness in conformity with the norm CAN/CSA-Z-259.10-M90. The safety belt must not be used as a falling protection.

3. Any equipment, tool or mean of protection that cannot be installed or used without compromizing the health and safety of the workers is considered inadequate for the work.
4. All mechanical equipments must be inspected before their delivery on site. Before using mechanical equipment, the general contractor must transmit to the CSC representative a certificate of conformity signed by an approved mechanic. At any time, if the CSC representative suspects a defect or a risk of accident, he can order the immediate shutdown of the machine and require a second inspection performed by a specialist of his choice.

1.5 MEETINGS

A decision-making representative of the general contractor must attend all meetings about job site health and safety issues.

1.6 RULING AGENCY REQUIREMENTS

1. Comply with all rules, regulations and applicable norms for the execution of the work.
2. Follow the prescribed norms and rules in order to assure a normal course of events in the work progress in situations of contaminated grounds by toxic products.
3. Despite the publication date of the indicated norms in the Safety Code for the construction industry, always use its most recent and applicable version during work.

1.7 CONDITIONS OF LAND

1. On site, the contractor should take into consideration the following particularities:
   a. Presence of under wiring
   b. Limitied space of work

1.8 HEALTH AND SAFETY MANAGEMENT

1. Accept and assume all tasks and obligations normally assigned to the master-builder in accordance with the Loi sur la santé et la sécurité du travail (L.R.Q., chapitre S-2.1) and the Safety Code for the construction industry (S-2.1, r.6).
2. Develop a prevention program specific for the work based on identification of the risks and put this program in application from the beginning of work to its demobilization. The prevention program must take into account the information in the article 1.7. It must be transmitted to all person involved in conformity with the article 1.2. The prevention program must include :
   a. The business policy regarding health and safety;
   b. The description of the work, the total cost of the work, the schedule with its workforce chart;
   c. A flowchart of the health and safety's responsabilities;
   d. The physical and material organization of the job site;
   e. The first-aid norms;

f. The identified risks on the job site;
g. The identification of the risks related to the work to be executed, including the prevention program and their applicability modality;
h. The required formation;
i. The procedures in situation of accident/injuries;
j. A written commitment from all stakeholders to comply with this prevention program;
k. A job site inspection schedule based on the prevention measures.

3. The general contractor must develop an efficient emergency plan, in relation with the job site caracteristics and conditions. The emergency plan must be transmitted to all invloved stakeholders, in conformity with the article 1.2. The emergency plan must include :
   a. The evacuation procedure;
   b. The identification of the ressources (police, firefighter, ambulance, etc.);
   c. The identification of the persons in charge of the job site;
   d. The identification of the first-aiders;
   e. The required formation for the persons in charge of its application;
   f. And any other information necessary related to the job site characteristics.

1.9 RESPONSABILITIES

1. No matter what is the size of the job site or the number of workers on site, always have an identified competent superviser responsible of the health and safety. Take all necessary measures to assure the health and safety of peoples and goods on and in the proximity of the job site that could be affected by the execution of the work.
2. Take all necessary measures to assure the application and the respect of all health and safety requirements indicated in the contractual documents, the federal and provincial regulations, the applicable norms and the prevention program specific for the job site and comply immediately to any prescription or notice of correction issued by the CSST.
3. Take all necessary measures to maintain the job site clean and in good order during the work.

1.10 COMMUNICATION AND SIGNAGE

1. Take all necessary measures to assure an efficient communication of the health and safety information on the job site. As soon as they arrive on the job site, all workers must be informed of the particularities of the prevention program, of their obligations and rights. The general contractor must insist on the worker's right to refuse to execute a work if they believe this work could imperil their health, their safety, their own physical integrity or the one of the other persons on the job site. The general contractor must maintain on the job site an updated register with the information transmitted and the signature of all the workers who received this formation.

2. The following information and documents must be displayed in an easily accessible place for the workers :
   a. Notice of work start;
   b. Identification of the master-builder;
   c. The business policy regarding health and safety at work;
   d. The prevention program specific to the job site;
   e. The emergency plan;
   f. Data sheet of all controlled products used on the job site;
   g. Minutes of meeting of the construction site committee;
   h. Name of the first-aiders;
   i. Intervention and correction reports published by the CSST.

1.11 UNFORSEENS

When a source of danger not specified in the specifications and not identified during the preliminary inspection of the job site occurs during the execution of the work, the general contractor must immediately stop the work, set up temporary protection measures for the workers and the public and warn the CSC representative verbally and by writing. The general contractor must afterwards proceed with the necessary modifications to the prevention program for the work to resume safely.

1.12 DYNAMITING

1. Dynamiting and the use of explosives is forbidden, unless authorized by written by the CSC representative.
2. Any operation involving explosives must be executed under the immediate supervision of a qualified blaster.
3. The acquisition, the transport, the storage and the use of explosives must respect all applicable federal and provincial rules and regulations.:
4. Canada: Explosives Act (E-17), Explosives regulations (C.R.C. CH. 599), norm related to the storage of explosives and detonators, TDG Act & Regulations.
   a. Quebec: Act respecting explosives (E-22), Regulation under the Act respecting explosives (E-22, r.1), Safety Code for the construction industry (S-2.1, r.6), Regulation on the transportation of dangerous substances.
5. The general contractor must secure all required permits in accordance with the above mentionned rules and regulations and he must keep a copy easily accessible on the job site.
6. The general contractor must facilitate the visit of the job site, of the explosives deposits and the inspection of the vehicles used for their transportation to all governmental representatives and police officers accredited to supervise explosives.

1.13 CAULKING GUNS AND OTHER CARTRIDGE DEVICES

Caulking guns or any other cartridge devices are forbidden on the CSC property.

Section 01 45 00 – Quality Control

1.0 GENERAL

1.1 INSPECTION

1. Refer to Standard Acquisition Clauses and Conditions (SACC) of PWGSC.
2. Allow CSC access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
3. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by CSC instructions, or law of Place of Work.
4. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
5. CSC will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

1. For backfiling and quality control, CSC will be responsible forhiring an independent inspection agency. The cost will be assumed by CSC.
2. Provide equipment required for executing inspection and testing by appointed agencies.
3. Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
4. If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by CSC at no cost. Pay costs for retesting and reinspection.

1.3 ACCESS TO WORK

1. Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
2. Co-operate to provide reasonable facilities for such access.

1.4 PROCEDURES

1. Notify appropriate agency andCSC in advance of requirement for tests, in order that attendance arrangements can be made.
2. Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
3. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 REJECTED WORK

1. Refer to Standard Acquisition Clauses and Conditions (SACC) of PWGSC.
2. Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by CSC as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
3. Make good other Contractor's work damaged by such removals or replacements promptly.
4. If in opinion of CSC it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by CSC.

1.6 REPORTS

1. Submit 4 copies of inspection and test reports to CSC.
2. Provide copies to subcontractor of work being inspected or tested.

1.7 TESTS AND MIX DESIGNS

1. Furnish test results and mix designs as requested.

1.8 MOCK-UPS

1. Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
2. Construct in locations acceptable to CSC.
3. Prepare mock-ups for CSC's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
4. Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
5. If requested, CSC will assist in preparing schedule fixing dates for preparation.
6. Remove mock-up at conclusion of Work or when acceptable to CSC.

7. Mock-ups may remain as part of Work.
8. Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.9 MILL TESTS

1. Submit mill test certificates as requested.

1.10 1.12 EQUIPMENT AND SYSTEMS

1. Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

Section 01 52 00 – Construction Facilities

1.0 GENERAL

1.1 REFERENCES

1. Standard Acquisition Clauses and Conditions (SACC) of PWGSC.
2. Canadian General Standards Board (CGSB)
   a. CAN/CGSB 1.189, Exterior Alkyd Primer for Wood.
   b. CGSB 1.59, Alkyd Exterior Gloss Enamel.
3. Canadian Standards Association (CSA International)
   a. CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
   b. CSA-0121-M1978(R2003), Douglas Fir Plywood.
   c. CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
   d. CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.
4. U.S. Environmental Protection Agency (EPA) / Office of Water
   a. EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

1. Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
2. Identify areas which have to be gravelled to prevent tracking of mud.
3. Indicate use of supplemental or other staging area.
4. Provide construction facilities in order to execute work expeditiously.
5. Remove from site all such work after use.

1.4 SCAFFOLDING

1. Scaffolding in accordance with CAN/CSA-S269.2.
2. Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs.

1.5 HOISTING

1. Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
2. Hoists cranes to be operated by qualified operator.

1.6 ELEVATORS

1. Designated existing and permanent elevators to be used by construction personnel and transporting of materials. Co-ordinate use with Departmental Representative.
2. Provide protective coverings for finish surfaces of cars and entrances.

1.7 SITE STORAGE/LOADING

1. Refer to Standard Acquisition Clauses and Conditions (SACC) of PWGSC.
2. Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
3. Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.8 CONSTRUCTION PARKING

1. Provide and maintain adequate access to project site.
2. Clean runways and taxi areas where used by Contractor's equipment.

1.9 SECURITY

1. Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.10 OFFICES

1. Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
2. Provide marked and fully stocked first-aid case in a readily available location.
3. Subcontractors to provide their own offices as necessary. Direct location of these offices.
4. Departmental Representative's and CSC's Site office.
    a. Provide temporary office for Departmental Representative.
    b. Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with 4 50% opening windows and one lockable door.
    c. Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.

d. Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
e. Install electrical lighting system to provide min 750 lx using surface mounted shielded commercial fixtures with 10 % upward light component.
f. Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.
g. Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300mm wide, one drawer filing cabinet, one plan rack and one coat rack and shelf.
h. Maintain in clean condition.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.12 SANITARY FACILITIES

1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
3. When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Departmental Representative

1.13 CONSTRUCTION SIGNAGE

1. Provide and erect project sign, within three weeks of signing Contract, in a location designated by Departmental Representative.
2. Construction sign 1.5 x 1.5m, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.
3. Indicate on sign, name of Owner, CSC and Contractor, of design style established by Departmental Representative and CSC.
4. No other signs or advertisements, other than warning signs, are permitted on site.
5. Provide project identification site sign comprising foundation, framing, and one 1200 x 2400 mm signboard as detailed and as described below.
   a. Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.
   b. Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
   c. Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.

d. Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
e. Fasteners: hot-dip galvanized steel nails and carriage bolts.
f. Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by Departmental Representative.

6. Locate project identification sign as directed by Departmental Representative and construct as follows:
   a. Build concrete foundation, erect framework, and attach signboard to framing.
   b. Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
   c. Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
7. Direct requests for approval to erect CSC/Contractor signboard to Departmental Representative. For consideration general appearance of CSC/Contractor signboard must conform to project identification site sign. Wording in both official languages.
8. Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
9. Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

1. Provide access and temporary relocated roads as necessary to maintain traffic.
2. Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
3. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
4. Protect travelling public from damage to person and property.
5. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
6. Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
7. Construct access and haul roads necessary.
8. Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
9. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
10. Dust control: adequate to ensure safe operation at all times.

11. Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
12. Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
13. Provide snow removal during period of Work.
14. Remove, upon completion of work, haul roads designated by Departmental Representative.

1.15 CLEAN-UP

1. Remove construction debris, waste materials, packaging material from work site daily.
2. Clean dirt or mud tracked onto paved or surfaced roadways.
3. Store materials resulting from demolition activities that are salvageable.
4. Stack stored new or salvaged material not in construction facilities.

2.0 PART 2 - PRODUCTS

2.1 NOT USED

1. Not Used.

3.0 PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction or sediment and erosion control drawings or sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

Section 01 61 00 – Common Product Requirements

1.0 GENERAL

1.1 REFERENCES

1. Standard Acquisition Clauses and Conditions (SACC) of PWGSC.
2. Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations
3. Conform to these reference standards, in whole or in part as specifically requested in specifications.
4. If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative and CSC reserves right to have such products or systems tested to prove or disprove conformance.
5. Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

1. Refer to Standard Acquisition Clauses and Conditions (SACC) of PWGSC.
2. Refer to DOC 14 and DOC 15.
3. Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
4. Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
5. Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
6. Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative and CSC based upon requirements of Contract Documents.
7. Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
8. Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

1. Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative and CSC of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
2. In event of failure to notify Departmental Representative and CSC at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative and CSC reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

1. Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
2. Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
3. Store products subject to damage from weather in weatherproof enclosures.
4. Store cementitious products clear of earth or concrete floors, and away from walls.
5. Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
6. Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
7. Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
8. Remove and replace damaged products at own expense and to satisfaction of CSC.
9. Touch-up damaged factory finished surfaces to CSC's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

1. Pay costs of transportation of products required in performance of Work.
2. Transportation cost of products supplied by Owner will be paid for Departmental Representative. Unload, handle and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

1. Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

2. Notify Departmental Representative and CSC in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative and CSC will establish course of action.
3. Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative and CSC to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

1. Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative and CSC if required Work is such as to make it impractical to produce required results.
2. Do not employ anyone unskilled in their required duties. Departmental Representative and CSC reserves right to require dismissal from site, workers deemed incompetent or careless.
3. Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative and CSC, whose decision is final.

1.8 CO-ORDINATION

1. Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
2. Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 CONCEALMENT

1. In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
2. Before installation inform Departmental Representative and CSC if there is interference. Install as directed by Departmental Representative and CSC.

1.10 REMEDIAL WORK

1. Refer to Standard Acquisition Clauses and Conditions (SACC) of PWGSC, DOC 14, DOC 15 and Section 01 73 00 - Execution Requirements.
2. Refer toDOC 14 and DOC 15.
3. Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
4. Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 LOCATION OF FIXTURES

1. Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
2. Inform CSC of conflicting installation. Install as directed.

1.12 FASTENINGS

1. Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
2. Prevent electrolytic action between dissimilar metals and materials.
3. Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
4. Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
5. Keep exposed fastenings to a minimum, space evenly and install neatly.
6. Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 FASTENINGS - EQUIPMENT

1. Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
2. Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
3. Bolts may not project more than one diameter beyond nuts.
4. Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

1. Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative and CSC.

1.15 EXISTING UTILITIES

1. When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
2. Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Section 01 74 11 - Cleaning

1.1 PROJECT CLEANLINESS

1. Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
2. Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative and CSC. Do not burn waste materials on site, unless approved by Departmental Representative and CSC.
3. Clear snow and ice from access to building, bank/pile snow in designated areas only, remove from site.
4. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
5. Provide on-site containers for collection of waste materials and debris.
6. Provide and use marked separate bins for recycling.
7. Dispose of waste materials and debris at designated dumping areas on Crown property off site.
8. Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
9. Store volatile waste in covered metal containers, and remove from premises at end of each working day.
10. Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
11. Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
12. Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

1. Refer to Standard Acquisition Clauses and Conditions (SACC) of PWGSC.
2. When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
3. Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
4. Prior to final review remove surplus products, tools, construction machinery and equipment.
5. Remove waste products and debris including that caused by Owner or other Contractors.

6. Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative or CSC. Do not burn waste materials on site, unless approved by Departmental Representative.
7. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
8. Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
9. Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
10. Clean lighting reflectors, lenses, and other lighting surfaces.
11. Vacuum clean and dust building interiors, behind grilles, louvres and screens.
12. Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
13. Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
14. Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
15. Remove dirt and other disfiguration from exterior surfaces.
16. Clean and sweep roofs, gutters, areaways, and sunken wells.
17. Sweep and wash clean paved areas.
18. Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
19. Clean roofs, downspouts, and drainage systems.
20. Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
21. Remove snow and ice from access to building.

1.3 WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

Section 01 77 00 – Closeout Procedures

1.0 PART 1 - GENERAL

1.1 REFERENCES

1. Standard Acquisition Clauses and Conditions (SACC) of PWGSC.

1.2 ADMINISTRATIVE REQUIREMENTS

1. Acceptance of Work Procedures:
   a. Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
      - Notify CSC in writing of satisfactory completion of Contractor's
      - Inspection and submit verification that corrections have been made.
      - Request Departmental Representative and CSC's inspection.
   b. Departmental Representative's and CSC's Inspection:
      - Departmental Representative and CSC and Contractor to inspect Work and identify defects and deficiencies.
      - Contractorto correct Work as directed.
   c. Completion Tasks: submit written certificates in English and French that tasks have been performed as follows:
      - Work: completed and inspected for compliance with Contract Documents.
      - Defects: corrected and deficiencies completed.
      - Equipment and systems: tested, adjusted and balanced and fully operational.
      - Certificates required by Fire Commissioner and Utility companies: submitted.
      - Operation of systems: demonstrated to Owner's personnel.
      - Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements copies of final Commissioning Report submitted to CSC.
      - Work: complete and ready for final inspection.
   d. Final Inspection:
      - When completion tasks are done, request final inspection of Work by CSC, and Contractor.
      - When Work incomplete according to CSC, complete outstanding items and request re-inspection.
   e. Declaration of Substantial Performance: when CSC considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance. .

f. Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

g. Final Payment:
   - When CSC considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
   - Refer to Standard Acquistion clauses and Conditions (SAAC) of PWGSC, DOC 14, DOC 15: when Work deemed incomplete by CSC, complete outstanding items and request re-inspection.

h. Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

1. Clean in accordance with Section 01 74 11 - Cleaning.
   a. Remove surplus materials, excess materials, rubbish, tools and equipment.
2. Waste Management: separate waste materials for reuse andrecycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal,01 35 21 - LEED Requirements.

Section 01 78 00 – Closeout Submittals

1.0 GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

1. Pre-warranty Meeting:
   a. Convene meeting one week prior to contract completion with contractor's representative and Departmental Representative and CSC, in accordance with Section 01 31 19 - Project Meetings to:
      - Verify Project requirements.
      - Review manufacturer's installation instructions and warranty requirements.
   b. Departmental Representative and CSC to establish communication procedures for:
      - Notifying construction warranty defects.
      - Determine priorities for type of defects.
      - Determine reasonable response time.
   c. Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
   d. Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
2. Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative and CSC, four final copies of operating and maintenance manuals in English and French.
3. Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
4. Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

1. Organize data as instructional manual.
2. Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
3. When multiple binders are used correlate data into related consistent groupings.
   a. Identify contents of each binder on spine.
4. Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
5. Arrange content by systems,process flow,under Section numbers and sequence of Table of Contents.

6. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
7. Text: manufacturer's printed data, or typewritten data.
8. Drawings: provide with reinforced punched binder tab.
   a. Bind in with text; fold larger drawings to size of text pages.
9. Provide 1:1 scaled CAD files in dwg format on CD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

1. Table of Contents for Each Volume: provide title of project;
   a. Date of submission; names.
   b. Addresses and telephone numbers of CSC and Contractor with name of responsible parties.
   c. Schedule of products and systems, indexed to content of volume.
2. For each product or system:
   a. List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
3. Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
4. Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
5. Typewritten Text: as required to supplement product data.
   a. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
6. Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

1. Maintain, in addition to requirements in General Conditions,at site for Departmental Representative and CSC one record copy of:
   a. Contract Drawings.
   b. Specifications.
   c. Addenda.
   d. Change Orders and other modifications to Contract.
   e. Reviewed shop drawings, product data, and samples.
   f. Field test records.
   g. Inspection certificates.
   h. Manufacturer's certificates.

2. Store record documents and samples in field office apart from documents used for construction.
   a. Provide files, racks, and secure storage.
3. Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
   a. Label each document "PROJECT RECORD" in neat, large, printed letters.
4. Maintain record documents in clean, dry and legible condition.
   a. Do not use record documents for construction purposes.
5. Keep record documents and samples available for inspection by Departmental Representative and CSC.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

1. Record information on set of black line opaque drawings, and in copy of Project Manual,provided by CSC.
2. Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
3. Record information concurrently with construction progress.
   a. Do not conceal Work until required information is recorded.
4. Contract Drawings and shop drawings: mark each item to record actual construction, including:
   a. Measured depths of elements of foundation in relation to finish first floor datum.
   b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   c. Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
   d. Field changes of dimension and detail.
   e. Changes made by change orders.
   f. Details not on original Contract Drawings.
   g. References to related shop drawings and modifications.
5. Specifications: mark each item to record actual construction, including:
   a. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
   b. Changes made by Addenda and change orders.
6. Other Documents: maintain manufacturer's certifications,inspection certifications,field test records,required by individual specifications sections.
7. Provide digital photos, if requested, for site records.

1.7 FINAL SURVEY

1. Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 EQUIPMENT AND SYSTEMS

1. For each item of equipment and each system include description of unit or system, and component parts.
   a. Give function, normal operation characteristics and limiting conditions.
   b. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
2. Panel board circuit directories: provide electrical service characteristics, controls, and communications.
3. Include installed colour coded wiring diagrams.
4. Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
   a. Include regulation, control, stopping, shut-down, and emergency instructions.
   b. Include summer, winter, and any special operating instructions.
5. Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
6. Provide servicing and lubrication schedule, and list of lubricants required.
7. Include manufacturer's printed operation and maintenance instructions.
8. Include sequence of operation by controls manufacturer.
9. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
10. Provide installed control diagrams by controls manufacturer.
11. Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
12. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
13. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
14. Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.
15. Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

1. Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
   a. Provide information for re-ordering custom manufactured products.
2. Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
3. Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
4. Additional requirements: as specified in individual specifications sections.

1.10 MAINTENANCE MATERIALS

1. Spare Parts:
   a. Provide spare parts, in quantities specified in individual specification sections.
   b. Provide items of same manufacture and quality as items in Work.
   c. Deliver to site location as directed; place and store.
   d. Receive and catalogue items.
      - Submit inventory listing to Departmental Representative and CSC.
      - Include approved listings in Maintenance Manual.
   e. Obtain receipt for delivered products and submit prior to final payment.
2. Extra Stock Materials:
   a. Provide maintenance and extra materials, in quantities specified in individual specification sections.
   b. Provide items of same manufacture and quality as items in Work.
   c. Deliver to site location as directed; place and store.
   d. Receive and catalogue items.
      - Submit inventory listing to Departmental Representative and CSC.
      - Include approved listings in Maintenance Manual.
   e. Obtain receipt for delivered products and submit prior to final payment.
3. Special Tools:
   a. Provide special tools, in quantities specified in individual specification section.
   b. Provide items with tags identifying their associated function and equipment.
   c. Deliver tosite location as directed; place and store.
   d. Receive and catalogue items.
      - Submit inventory listing to Departmental Representative and CSC.
      - Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE AND HANDLING

1. Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
2. Store in original and undamaged condition with manufacturer's seal and labels intact.
3. Store components subject to damage from weather in weatherproof enclosures.
4. Store paints and freezable materials in a heated and ventilated room.
5. Remove and replace damaged products at own expense and for review by Departmental Representative and CSC.

1.12 WARRANTIES AND BONDS

1. Develop warranty management plan to contain information relevant to Warranties.
2. Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative and CSC approval.
3. Warranty management plan to include required actions and documents to assure that Departmental Representative and CSC Representavive receives warranties to which it is entitled.
4. Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
5. Submit, warranty information made available during construction phase, to Departmental Representative and CSC for approval prior to each monthly pay estimate.
6. Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
   a. Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
   b. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
   c. Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
   d. Verify that documents are in proper form, contain full information, and are notarized.
   e. Co-execute submittals when required.
   f. Retain warranties and bonds until time specified for submittal.
7. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
8. Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative and CSC.

9. Include information contained in warranty management plan as follows:
   a. Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
   b. Listing and status of delivery of Certificates of Warranty for extended warranty items, to include commissioned systems such as fire protection,alarm systems,sprinkler systems.
   c. Provide list for each warranted equipment, item, feature of construction or system indicating:
      - Name of item.
      - Model and serial numbers.
      - Location where installed.
      - Name and phone numbers of manufacturers or suppliers.
      - Names, addresses and telephone numbers of sources of spare parts.
      - Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
      - Cross-reference to warranty certificates as applicable.
      - Starting point and duration of warranty period.
      - Summary of maintenance procedures required to continue warranty in force.
      - Cross-Reference to specific pertinent Operation and Maintenance manuals.
      - Organization, names and phone numbers of persons to call for warranty service.
      - Typical response time and repair time expected for various warranted equipment.
   d. Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
   e. Procedure and status of tagging of equipment covered by extended warranties.
   f. Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
10. Respond in timely manner to oral or written notification of required construction warranty repair work.
11. Written verification to follow oral instructions.
   a. Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.13 WARRANTY TAGS

1. Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative and CSC.
2. Attach tags with copper wire and spray with waterproof silicone coating.
3. Leave date of acceptance until project is accepted for occupancy.
4. Indicate following information on tag:
   a. Type of product/material.
   b. Model number.
   c. Serial number.
   d. Contract number.
   e. Warranty period.
   f. Inspector's signature.
   g. Construction Contractor.

Section 01 79 00 – Demonstration and Training

1.0 PART 1 - GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

1. Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection.
2. Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
3. Preparation:
   a. Verify conditions for demonstration and instructions comply with requirements.
   b. Verify designated personnel are present.
   c. Ensure equipment has been inspected and put into operation
   d. Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
4. Demonstration and Instructions:
   a. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment designated location.
   b. Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
   c. Review contents of manual in detail to explain aspects of operation and maintenance.
   d. Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
2. Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative 's and CSC's approval.
3. Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
4. Give time and date of each demonstration, with list of persons present.
5. Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

1. When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
   a. Instruct Owner's personnel.
   b. Provide written report that demonstration and instructions have been completed.

Section 21 05 05 – Common Work Results for Fire Suppression –

1.0 PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

1. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
2. Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in Province, Canada.
3. Shop drawings to show:
   a. Mounting arrangements.
   b. Operating and maintenance clearances.
4. Shop drawings and product data accompanied by:
   a. Detailed drawings of bases, supports, and anchor bolts.
   b. Acoustical sound power data, where applicable.
   c. Points of operation on performance curves.
   d. Manufacturer to certify current model production.
   e. Certification of compliance to applicable codes.
5. In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
6. Closeout Submittals:
   a. Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
   b. Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative and CSC before final inspection.
   c. Operation data to include:
      - Control schematics for systems including environmental controls.
      - Description of systems and their controls.
      - Description of operation of systems at various loads together with reset schedules and seasonal variances.
      - Operation instruction for systems and component.
      - Description of actions to be taken in event of equipment failure.
      - Valves schedule and flow diagram.
      - Colour coding chart.

d. Maintenance data to include:
   - Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
   - Data to include schedules of tasks, frequency, tools required and task time.

e. Performance data to include:
   - Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
   - Equipment performance verification test results.
   - Special performance data as specified.
   - Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

f. Approvals:
   - Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative and CSC for approval. Submission of individual data will not be accepted unless directed by Departmental Representative and CSC.
   - Make changes as required and re-submit as directed by DepartmentaL Representative and CSC.

7. Additional data:
   a. Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
   b. SPEC NOTE: Do not use the following "as-built drawings" paragraphs for DOT projects.
8. Site records:
   a. Departmental Representative and CSC will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
   b. Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
   c. Use different colour waterproof ink for each service.
   d. Make available for reference purposes and inspection.
9. As-Built drawings:
   a. Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
   b. Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
   c. Submit to Departmental Representative and CSC for approval and make corrections as directed.

d. Perform testing, adjusting and balancing for HVAC using as-built drawings.
e. Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

10. Submit copies of as-built drawings for inclusion in final TAB report.

1.2 QUALITY ASSURANCE

1. Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
2. Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.3 MAINTENANCE

1. Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.
2. Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 DELIVERY, STORAGE, AND HANDLING

1. Waste Management and Disposal:
   f. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 CLEANING

1. Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.
2. At all times, and as long as the progress of work allows, the contractor will keep the work site clean, in good order and free from any accumulation of debris.
3. For projects where work generates dust, the contractor must clean the fire detectors in the construction zone at the end of work

1.6 DRAWINGS & SPECIFICATIONS

1. The drawings and specifications are intended to include all work and material required to complete all work and to ensure that all systems are delivered, installed and ready for continuous and efficient operation. Any material, work or details mentioned in the specifications and omitted from the drawings, or indicated on the drawings but omitted from the specifications, or omitted from both but

required by the code or obvious, will be done and furnished without extra charge, as this is an integral part of the contract.

2. The drawings shown are schematic. They indicate the approximate layout of connections. The contractor should do all installations respecting existing installations. The contractor should consult the manufacturer drawings of all equipment before proceeding with work and must foresee all accessories, supports, and connections for the adequate installation of equipment. This implies, without limitation, that the contractor is responsible for carrying-out all work, including work that is not detailed in the drawings but implicitly necessary to complete the project.
3. If a contradiction is found in the drawings, specifications, clauses concerning equipment to supply, quantity, quality standards, etc., or if an omission or an error is observed in the tender documents, the contractor must immediately advise CSC.
4. All changes during work must be indicated on the drawings as they are produced throughout the course of work.

1.7 EXISTING CONDITIONS

It is assumed that the contractor has examined the site and local conditions affecting work and is satisfied that all work can be carried out within the limitations set by existing conditions. No extra will be paid resulting from established existing conditions. No extra will be paid for expenses incurred because the contractor omitted to examine the site and local conditions.

1.8 MATERIAL & WORKMANSHIP

1. All materials and equipment required for the work, except if specified otherwise, must be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to properly fit into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the local engineer shall be furnished. Used, rejected or damaged equipment or material will not be accepted.
2. All equipments must be U.LC. And C.S.A. Approved.

1.9 EQUIPMENT INSTALLATION

1. If any controversial points are encountered by the contractor, the local engineer and/or architect must be notified by the contractor in writing for approval before continuing the work. If, in the opinion of the contractor, any changes should be made to quicken or complete the work in a better way, the contractor must notify the engineer of such suggested changes in writing for approval before continuing with the work.

2. The exact layout of equipment and conduits are to be coordinated during the on-site visit with the client or client representative.

1.10 SEALING OF OPENINGS

The contractor is responsible for sealing all pipe and duct openings through floors and walls with lean concrete or '3m; cp25' to maintain air tightness and acoustic separation. Refer to the 3m technical user's guide. Any removal of wall, ceiling or floor equipment will be done including resurfacing and paint.

1.11 Openings and sleeves

In order to avoid unnecessary cuts in masonry and concrete, the Contractor shall provide and install sleeves in walls and floors, for floor drains and other accessories before pouring the floors and the erection of walls. Sleeves should be provided for pipes passing through walls and slabs.

1.12 EQUIPMENT PROTECTION & CLEARANCE

Any equipment which may require service, maintenance or adjustment must be installed in such a way as to allow easy access to the equipment. The contractor must ensure that all equipment can be installed as shown on drawings. The contractor is responsible for providing adequate protection against the elements, dirt and other damage for all on site equipment related to the project, from the time it is received until final work acceptance.
Mechanical Specification

2.0 FIRE PROTECTION - CONSTRUCTION SPECIFICATIONS

2.1 Codes and regulations :

The installation and the tests of the various fire protection systems will have to be in accordance with the standards, codes and current regulations:

1. 2010 National Building Code
2. National Fire Protection Code (2010)
3. CAN/ULC-S524, CAN/ULC-S537
4. NFPA 13

The contents of these regulations and codes will have precedence everything which is shown on drawings

2.2 WORKS TO BE REALIZED

1. All the works of demolition and construction, as shown in the plans and\or specifications.
2. Supply and installation of the necessary equipments and components required to execute the works as shown in the plans and\or specifications

3. Hydraulique test complete with report
4. All the blanking, the fireguard and smoke sealing work.
5. All the control and the fire alarm work related to pre-action fire system.
6. The start up and the checking of all the equipment that the fire protection contractor supplies and install.
7. As built drawings

2.3 AUTOMATIC SPRINKLERS

1. Supply all the manpower, the tools and the equipment required for the installation of a automatic sprinklers system.
2. The works include without limiting itself to:
   a. Water pressure and flow test (if authorized by customer) and hydraulic calculations :
   b. Subject to the engineer all the execution drawings according to the nfpa requirements.
   c. Supply and installation of a dry pipe system network, pre-action type, linked to the by fire protection integrated existing " fireflex " system including a fire alarm network.
   d. Supply the workshop drawings.

2.4 CALCULATIONS CRITERIA

1. une occupation à risque léger. a light risk occupation.
2. avec une densité de 0.1 gpm/pi². With a density of 0.1 gpm / pi ².
3. sur une surface d'application :salle entière- On a surface of: whole room

2.5 CONNECTION TO THE EXISTING NETWORKS

1. Materials and manpower required for the draining and the filling of existing networks are at the expense of the fire protection contractor.
2. The connection works must be coordinated with the representative of the customer who can require that the works be realized at night, the week end or during a holiday vacation. The fire protection contractor will have to include in his submission all the costs related with these requirements.
3. All the works of connecting to the existing networks are at the expense of the fire protection contractor. The only role of the representative of the customer or his representative is a role of supervision.

2.6 PIPING INSTALLATION - GENERAL

1. The fire protection contractor will have to install all his piping and fire protection equipments as high as possible.

2. Install the piping in a straight line, near the walls, ceilings and in parallel to these surfaces. Settle the slope of the piping according to the prescriptions. Use standard fittings and elbows with long radius when the pipe changes direction.
3. Bore the extremities of pipes before proceeding to the connection.
4. Clean the extremities of pipes and cavities of the fittings which must be brazed or welded. Join the parts without jamming them.
5. Remove the deposits and dirt inside and outside, before and after the assembly.

2.7 TESTS AND APPROVAL

1. All the fire protection piping must be subjected to the tests in accordance with the NFPA-13, last revision recommendations (100 psig for a period of two hours) including the testing of the detection signals operation.
2. The contractor will have to pay all the incurred expenses required by the tests. He will have to supply valves, hydraulic pumps, manometers, etc. As well as the necessary manpower for the wanted tests above.
3. All the tests must be executed and approved before the piping is hidden. The contractor will have to correct, as fast as possible, any imperfection which would appear during the tests to the entire satisfaction of the engineer and the concerned authorities.

2.8 IDENTIFICATION

The present fire protection contractor will supply and install all the signs required by the fire department and in compliance to the nfpa standards.

2.9 PAINT

Paint the supports of black steel piping as well as all the visible black steel piping.

1. The colour of the paint should be similar to the existing one.
   - Clean with sicosol 875-104 and sicoprep 771-104
   - Thorough coat corrostop, finish is similar to the existing.
   - Finish: corrostop 631-150, similar to the existing.

2.10 REPORT AND CERTIFICATE

An inspection report and a certificate of inspection must be supplied to the engineer at the end of the project. The results of all the tests must be recorded and annexed to the inspection report.

2.11 PIPINGS AND ACCESSORIES FOR DRY SYSTEM

1. The piping, fittings and accessories will be astm-123 galvanized steel, which could substain a pressure of 300 psig. All the piping has to have a ratio of resistance to corrosion (ccr) of 1 or more.
2. Victaulic or threaded fittings are accepted. Welded fittings are prohibited
3. Piping such as made by " wheatland or allied " of American manufacture
   - Pipe 25 to 50mm schedule 40 galvanized steel (cut groove or welded).
   - Pipe 65 to 150mm schedule 40 galvanized steel (cut groove or welded).

- Victaulic fittings(65 to 150mm) assembled with"cut-groove" type piping. Acceptable product: " 009 firelock ez " fitting and " gasket flushseal " from victaulic.
- Thread joints (0 to 50mm) are accepted.
- Only welding executed in workshop is allowed and has to be in accordance with the nfpa and astm a-234standards
- All the pipes will be new, straight, without flake, clean and ready to be installed. All the pipes will be bored having been cut inside and will be freed from filings or other obstructions before installing them.
- For the secondary branches, foresee 1/2 " in 10 ' slope towards the main piping and of 1/4 " in 10 ' slope for the main piping.

2.12 PIPINGS AND ACCESSORIES FOR WET SYSTEM

1. The piping, the joins and the accessories will be astm a53 steel black, which could substain a pressure of 300 psig.
2. Victaulic or threaded fittings are accepted. Welded fittings are prohibited
3. Piping: such as made by " wheatland or allied " of American manufacture
   - 25 to 50mm pipe in astm a53 black steel schedule 40.
   - 65 to 200mm pipe in astm a53 black steel schedule 10.
4. Victaulic fittings (65 to 150mm) or threaded joints (0 to 50mm) are accepted. Only welding executed in workshop is allowed and has to be in accordance with the nfpa and astm a-234standards Acceptable product: " 009 firelock ez " fitting and " gasket flushseal " from victaulic.
5. All the pipes will be new, straight, without flake, clean and ready to be installed. All the pipes will be bored having been cut inside and will be freed from filings or other obstructions before installing them.

2.13 FITTINGS

All the fittings will be in moldable cast iron 125 class, long radius type ,victaulic or equivalent. The folding of the pipe on the construction site will not be allowed. Any reduction of diameter will be realized with an eccentric reducer.

2.14 THREADED JOINTS

The threading of pipes will have to assure once screwed, a length of contact of at least 19mm. All the thread joints will have to be painted with the tite seal on the male part before the installation. Joints made by means of Teflon or equivalent ribbon will not be accepted, refer to the standard ansi-b2.1.

2.15 GROOVED JOINTS

All the grooved joints will be victaulic type or equivalent.

2.16 SUSPENSION OF THE PIPING WITH PARASISMIC SUPPORTS

1. Plan the addition parasismic protection such as asked by the cnb and specified by nfpa.
2. Supply and install the parasismic supports of hilti or tolco brand required to support the steel piping transporting water and that the lateral force is equal to 0.5 g.
3. Details from tolco and hilti are presented on the details plan.
4. Respect the requirements indicated for these selections in hanger rod diameter, distance between the vertical hanger, maximum transverse brace spacing and longitudinal maximum brace spacing according to the slope of brace.

2.17 AUTOMATIC SPRINKLER HEAD

The automatic sprinklers heads must be ulc and fm approved such as Viking's microfast QR model (or equivalent) with K5.6 factor, finish chrome-plates with a temperature of operation of 155°f 68°c such as shown in the plan. Furthermore, they must be provided with the d1 protection (technical room only).

2.18 VALVES

1. Supply and install all the valves, at the necessary places for the good functioning of the system as required by the nfpa-13 standard, current edition.
2. Valves must be victaulic or equivalent ulc approved type. The zones valves have to be of supervise type and be provided with an electric ulc approved contact.

2.19 DETECTION SYSTEM AND WARNING DEVICES FOR DRY SYSTEM

See plan M3.

2.20 DRAINING

Drains must be installed in the low points of the piping. The contractor will have to install all the necessary valves and the piping to allow to drain the water towards the drains. He will have to foresee, supply and install the piping towards the drains.

Section 28 31 00 – Fire Detection and Alarm

1.0 PART 1 - GENERAL

1.1 SUMMARY

1. Section Includes:
   a. Materials and installation for fire alarm systems.
   b. Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general two-stage alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.
   c. Trouble signal devices.
   d. Power supply facilities.
   e. Manual alarm stations.
   f. Automatic alarm initiating devices.
   g. Audible signal devices.
   h. End-of-line devices.
   i. Annunciators.
   j. Visual alarm signal devices.
   k. Ancillary devices.

1.2 REFERENCES

1. Government of Canada
   a. TB OSH Chapter 3-03, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire protection Electronic Data Processing Equipment.
   b. TB OSH Chapter 3-04, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
2. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
   a. Material Safety Data Sheets (MSDS).
3. Underwriter's Laboratories of Canada (ULC)
   a. CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems.
   b. CAN/ULC-S525, Audible Signal Device for Fire Alarm Systems.
   c. CAN/ULC-S526, Visual Signal Devices for Fire Alarm Systems.
   d. CAN/ULC-S527, Control Units.
   e. CAN/ULC-S528, Manual Pull Stations for Fire Alarm Systems.
   f. CAN/ULC-S529, Smoke Detectors for Fire Alarm Systems.
   g. CAN/ULC-S530-M1991, Heat Actuated Fire Detectors for Fire Alarm Systems.
   h. CAN/ULC-S531, Standard for Smoke Alarms.
   i. CAN/ULC-S536-S537, Burglar and Fire Alarm Systems and Components.

4. National Fire Protection Agency
   a. NFPA 72 National Fire Alarm Code.
   b. NFPA 90A Installation of Air Conditioning and Ventilating Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

1. Product Data:
   a. Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
      - Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
2. Shop Drawings:
   a. Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
      - Shop drawings: stamped and signed by professional engineer registered or licensed in Province Canada.
   b. Include:
      - Layout of equipment.
      - Zoning.
      - Complete wiring diagram, including schematics of modules.
3. Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
   a. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
   b. Instructions: submit manufacturer's installation instructions.
   c. Manufacturer's Field Reports: manufacturer's field reports specified.
4. Closeout Submittals:
   a. Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.
   b. Authority of Jurisdiction will delegate authority for review and approval of submittals required by this Section.
   c. Submit to Authority of Jurisdiction 2 sets of approved submittals and drawings immediately after approval but no later than 15 working days to prior to final inspection.
   d. Submit following:
      - Manufacturer's Data for:
        - Control panel and modules.
        - Storage batteries.
        - Battery charger.
        - Manual pull stations.

- Heat detectors.
- Open-area smoke detectors.
- Duct smoke detectors.
- Alarm bells.
- Alarm horns.
- Visible appliances.
- Main annunciator.
- Remote annunciator panel.
- Graphic annunciator panel.
- Master fire alarm boxes.
- Auxiliary transmitter.
- Master box pedestal.
- Radio master box pedestal.
- Master box.
- Radio master box location light.
- Radio fire alarm master box.
- Radio fire alarm auxiliary transmitter.
- Radio fire alarm interface panel.
- Combination auxiliary transmitter and interface panel.
- Freeze protection thermostatic switch.
- Electro-magnetic door holder-releases.
- Valve tamper switches.
- Wiring.
- Ground rods.
- Conduit.
- Outlet boxes.
- Fittings for conduit and outlet boxes.
- Trouble bell buzzer.
- Projected beam smoke detector.
- Surge suppression devices.
- Mark data which describe more than one type of item to indicate which type will be provided.
- Submit 1 original for each item and clear, legible, first-generation photocopies for remainder of specified copies.

▪ System wiring diagrams:
  - Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.
  - Show modules, relays, switches and lamps in control panel.

▪ Design data: Power Calculations:

- Submit design calculations for existing system and new work specified to substantiate that battery capacity exceeds supervisory and alarm power requirements.
- Show comparison of detector power requirements per zone versus control panel smoke detector power output per zone in both standby and alarm modes.
- Show comparison of notification appliance circuit alarm power requirements with rated circuit power output.

- Instructions for operation:
  - Projected beam smoke detector.
- Schedules:
  - Conductor wire marker schedule.
- Test Reports:
  - Open-area 2-wire smoke detectors.
  - Preliminary testing:
    - ✓ Final acceptance testing.
    - ✓ Submit for inspections and tests specified under Field Quality Control.

1.4 QUALITY ASSURANCE

1. Qualifications:
   a. Installer: company or person specializing in fire alarm system installations with 5 -years documented experience and approved by manufacturer.
2. Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.
3. System:
   a. To TB OSH Chapter 3-04.
   b. Subject to Fire Commissioner of Canada (FC) approval.
   c. Subject to FC inspection for final acceptance.
   d. To Canadian Forces Fire Marshal approval.
4. Extra Materials:
   a. Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
   b. Include:

      spare glass rods for manual pull box stations if applicable.
5. Maintenance Service:
   a. Provide one year's free maintenance with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Departmental Representative and Consultant.

1.5 DELIVERY, STORAGE, AND HANDLING

1. Packing, shipping, handling and unloading:
   a. Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
   b. Deliver, store and handle materials in accordance with manufacturer's written instructions.
2. Waste Management and Disposal:
   a. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS

1. Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
2. Power supply: to CAN/ULC-S524.
3. Audible signal devices: to CAN/ULC-S525.
4. Visual signal devices: to CAN/ULC-S526.
5. Control unit: to CAN/ULC-S527.
6. Manual pull stations: to CAN/ULC-S528.
7. Thermal detectors: to CAN/ULC-S530.
8. Smoke detectors: to CAN/ULC-S529.
9. Smoke alarms: to CAN/ULC-S531.

2.2 SYSTEM OPERATION

1. Provide complete, electrically supervised, code 3 temporal common coded, manual and automatic, zoned, annunciated, fire alarm system.
2. Provide separate circuits from control panel to each zone of initiating devices. Transmission of signals from more than one zone over common circuit to control panel is prohibited.
3. Single stage operation. Operation to actuation following:
   a. Manual station.
   b. Heat detector.
   c. Smoke detector.
   d. Automatic fire sprinkler system.
   e. Fire extinguishing system.
   f. Fire standpipe system.

4. Actuation of single operation device to initiate following:
   a. Building evacuation alarm devices to operate continuously.
   b. Transmit signal to fire department via fire alarm transmitter and monitoring station.
   c. Zone of alarm device to be indicated on control panel annunciator.
   d. Air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
   e. Fire doors and smoke control doors if normally held open, to close automatically.
   f. Electro-magnetic door holders to de-energize.
   g. Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.
5. Two stage operation: operation to actuation following:
   a. Manual station.
   b. Heat detector.
   c. Smoke detector.
   d. Automatic fire sprinkler system.
   e. Fire extinguishing system.
   f. Fire standpipe system.
6. Actuation of two stage operation device to initiate following:
   - Audible signal devices throughout building to sound at 20 strokes per minute.
   - Audible signal devices in zone of alarm and adjacent zones on same floor level,zones on floor level immediately above and floor level immediately below to sound continuously while other audible signal devices throughout building sound at 20 strokes per minute.
   - Zone of alarm to be indicated on control panel and remote annunciator.
   - Transmit signal to fire department via fire alarm transmitter and monitoring station.
   - Air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
   - Fire doors and smoke control doors if normally held open, to close automatically.
   - Electro-magnetic door holders to de-energize.
   - Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.
7. Operation of alarm initiating device on second stage to:
   a. Cause audible signal devices throughout building to sound continuously.
8. Capability to program smoke detector status change confirmation on any or zones in accordance with CAN/ULC-S527, Appendix C.

2.3 MANUAL ALARM STATIONS

1. Provide non-coded single or double action type with mechanical reset features.
   a. Non-coded single pole normally open contact for single stage.
   b. General alarm key switch for two stage system.
2. Stations: surface mounted and interior type as indicated.
   a. For surface mounting provide station manufacturer's approved back box.
   b. Back box finish to match station finish.
3. Equip each station with terminal strip with contacts of proper number and type to perform functions required.
4. Stations: type not subject to operation by jarring or vibration.
   a. Break-glass-front stations are not permitted; pull-lever break-rod type is acceptable provided presence of rod is not required to reset station.
5. Station colour: red.
6. Provide station with visible indication of operation.
7. Restoration to require use of key.
   a. Keys: identical throughout system for stations and control panel(s).
8. Mount stations with operating lever not more than 1.2 m above finished floor.
9. Where weatherproof stations are required, provide stations with cast metal, weatherproof housings with hinged access doors.
   a. Finish housings with red enamel paint and provide permanently affixed engravedraised-letter metal bilingual signage indicating "FIRE ALARM" with white letters of 19 mm high.

2.4 AUTOMATIC ALARM INITIATING DEVICES

1. Heat detectors: provide heat detectors designed for detection of fire by combination fixed temperature rate-of-rise or rate compensating line-type fixed temperature principle.
2. Combination Fixed Temperature Rate-Of-Rise Detectors (Spot Type): designed for surface,semi-flush outlet box mounting and supported independently of conduit, tubing or wiring connections.
   a. Contacts: self-resetting after response to rate-of-rise actuation
   b. Operation under fixed temperature actuation to result in external indication.
   c. Detector units located in boiler rooms, showers, or other areas subject to abnormal temperature changes to operate on fixed temperature principle only.
3. Rate Compensating Detector (Spot Type): designed for surface,flush,vertical unit outlet box mounting and supported independently of conduit, tubing or wiring connections.
   a. Detectors: hermetically sealed and automatically resetting type which will operate when ambient air temperature reaches detector setting regardless of rate of temperature rise.
   b. Detector operation: not be subject to thermal time lag.

4. Line-Type Fixed Temperature Detectors: provide thermostatic or thermistor line-type heat detection cable with weather-resistant outer covering where indicated.
   a. Cable: nominally rated for temperature of 68 degrees C and operate on fixed temperature principle.
5. Open-Area Smoke Detectors: provide detectors designed for detection of abnormal smoke densities by photoelectric principle.
   a. Detectors: 4-wire or 2-wire type.
   b. Provide necessary control and power modules required for operation integral with control panel.
   c. Detectors and associated modules: compatible with control panel and suitable for use in supervised circuit.
   d. Malfunction of electrical circuits to detector or its control or power units to result in operation of system trouble signals.
   e. Equip each detector with visible indicator lamp that will flash when detector is in normal standby mode and glow continuously when detector is activated.
   f. Provide remote indicator lamps for each detector that is located above suspended ceilings, beneath raised floors, concealed from view.
   g. Each detector: plug-in type with tab-lock or twist-lock, quick disconnect head and separate base in which detector base contains screw terminals for making wiring connections.
   h. Detector head: removable from its base without disconnecting wires. Removal of detector head from its base to cause activation of system trouble signals.
   i. Screen each detector to prevent entrance of insects into detection chamber(s).
6. 4-Wire Smoke Detectors: detector circuits 4-wire type capable of transmitting detector operating power over conductors separate from initiating circuit.
   a. Provide separate, power circuit for each smoke detection initiating circuit (zone).
   b. Failure of power circuit to be indicated as trouble condition on corresponding initiating circuit.
7. 2-Wire Smoke Detectors: detector circuits of 2-wire type capable of transmitting detector operating power over initiating circuit are permitted, provided detectors used are approved by control panel manufacturer for use with control panel provided and are ULC listed as being compatible with control panel.
   a. Total number of detectors on any detection circuit: not exceed 80% of maximum number of detectors allowed by control panel manufacturer for that circuit. Provide additional zones if required to meet this requirement.
   b. Detectors: not susceptible to operation by changes in relative humidity.
8. Photoelectric Detectors: operate on light scattering principle using LED light source.
   a. Detector: respond to both flaming and smoldering fires.
9. Locate detectors in accordance with their listing by ULC and the requirements of NFPA 72, except provide at least 2 detectors in rooms of 54 square meters or larger in area.

10. Mount detectors at underside of ceiling or deck above unless otherwise indicated.
    a. For mounting heights greater than 3 m above floor level, reduce actual detector linear spacing from listed spacing as required by NFPA 72.
    b. For heights greater than 9 m space detectors no farther apart than 34% of their listed spacing.
11. Temperature rating of detectors: in accordance with NFPA 72.
12. Locate detectors minimum 300 mm to lighting fixtures and not closer than 600 mm to air supply or return diffuser.
13. Ensure detectors, located in areas subject to moisture or exterior atmospheric conditions or hazardous locations as defined by NFPA 70, are approved for such locations.
14. Provide detectors with terminal screw type connections.
15. Removal of detector head from its base to cause activation of system trouble signals if detectors are provided with separable heads and bases.

2.5 ALARM INITIATING DEVICE SPACING AND LOCATION

1. Detector spacing and location: in accordance with manufacturer's recommendations and requirements of NFPA 72.
2. Provide at least 2 detectors in rooms of 54 square meters or larger.
3. Spacing: not to exceed 9 m by 9 m per detector, and 9 linear m per detector along corridors.
4. Locate detectors minimum 1.5 m from air discharge or return grille, and not closer than 300 mm to lighting fixtures.
5. In areas without finished ceilings, mount detectors at underside of deck above unless otherwise indicated.
6. Mount detectors installed beneath raised floors with base within 50 mm of underside of raised floor, with detector facing downward.
    a. Where space under raised floor is less than 300 mm in height, mount detectors with their bases either horizontal or vertical, with detection chamber(s) located in upper half of underfloor space.
    b. Do not mount detectors facing upward.
    c. Space detectors beneath raised floors maximum 6 m by 6 m per detector.

2.6 DUCT SMOKE DETECTORS

1. Provide detectors installed in ducts of photoelectric type and listed by ULC duct installation.
2. Provide integral control and power modules required for operation with main control panel.
3. Ensure detectors and associated modules are compatible with main control panel and suitable for use in supervised circuit.
4. Detector circuits: 4-wire type where detector operating power is transmitted over conductors separate from initiating circuit. Malfunction of electrical circuits to detector or its control or power modules to cause operation of system trouble signals.

5. Provide a separate, fused power circuit for each smoke detection initiating circuit.
6. Failure of power circuit: indicated as a trouble condition on corresponding initiating circuit.
7. Provide duct detectors in accordance with NFPA 90A.
8. Provide duct detectors with approved duct housing, mounted exterior to duct, with perforated sampling tubes extending across width of duct.
9. Activation of duct detectors to cause shutdown of associated air handling unit annunciation at control panel and tripping ofmaster box transmitter and sounding of building evacuation alarms.
10. Provide detectors with visible indicator lamp that flashes when detector is in normal standby mode and glows continuously when detector is activated.
11. Provide remote indicator lamp for each detector.
12. Permanently label remote indicator with description number of associated air handling unit(s).
13. Provide each detector with remote test switch. Mount switch not more than1.8 m above finished floor.
14. Permanently label test switch with description number of associated air handling unit(s).

2.7 AUDIBLE SIGNAL DEVICES

1. Provide remote system trouble 100mm bell/buzzer arranged to operate in conjunction with panel's integral trouble signal.
2. Locate remote trouble bell/ buzzer as indicated.
   a. Provide 100 mm trouble bell external trouble buzzer at control panel arranged to operate in conjunction with panel's integral trouble signal.
   b. Provide trouble bell/buzzer with rigid plastic white on red engraved identification sign which reads "FIRE ALARM SYSTEM TROUBLE".
   c. Lettering on identification sign: minimum 25mm high.
3. Audible device(s):
   a. Bells: flush, surface or recessed mounted, single stroke, polarized, 24 V dc, 250 mm.
   b. Signal chimes: heavy duty, single stroke, 24 V dc, with solid striking plunger and resonating chamber.
   c. Bells: vibrating ormotorized type, gongs of special alloy steel, 24 V dc, 250 mm
   d. Horns: flush mounting, 24 V dc.
   e. Mini-horns: surface or flush mounting, red colour, 24 V dc.
4. Do not exceed 80 percent of listed rating in amperes of notification appliance circuit. Provide additional circuits above those shown if required to meet this requirement.
5. Provide appliances specifically listed for outdoor use in locations exposed to weather.
6. Finish appliances in red enamel.
7. For surface mounting provide appliance manufacturer's approved back box. Back box finish to match appliance finish.

2.8 END-OF-LINE DEVICES

1. End-of-line devices to control supervisory current in alarm circuits and signalling circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

2.9 REMOTE ANNUNCIATOR PANELS

1. Provide panel where indicated mounted 1.5 m above finished floor elevation.
2. Panels: duplicate requirements for control panel annunciator, with exception of individual trouble lamps are not required.
3. LED type with designation cards to indicate zone.
4. LEDs to annunciate alarm and trouble.
5. Wired in multiple with main control panel and with other remote annunciator panels.
6. Supervised, including trouble signal for open circuit.
7. LED test button.

2.10 GRAPHIC ANNUNCIATOR PANEL

1. Provide panel located as shown.
2. Mount with panel centerline 1.5 m above finished floor elevation.
3. Panel: interior weatherproof type, flush surface pedestal-mounted.
4. Panel: provided with building room floor plan, drawn to scale, with alarm lamps mounted to represent location of each concealed detector each initiating device.
5. Panel graphic: show locations of annunciator panel and control panel, and have "you are here" arrow showing its location. Orient building floor plan on graphic to location of person viewing graphic, i.e. direction viewer is facing is toward top of graphic display. Provide North arrow.
6. Label principal rooms and areas shown with room numbers titles.
7. Provide detectors mounted above ceilings on ceilings, beneath raised floors and different types of initiating devices with different symbols lamps of different colours for identification. Lamps to illuminate upon activation of corresponding device and remain illuminated until system is reset.
   a. Provide panel with lamp test switch.

2.11 VISUAL ALARM SIGNAL DEVICES

1. Surface or Flush-mounted assembly of stroboscopic type suitable for use in electrically supervised circuit and powered from notification appliance circuit.
2. Appliances: minimum of 110 candela measured as approved by ULC, but not less than effective intensity required by National Building Code of Canada for appliance spacing and location shown.

3. Protect lamps with thermoplastic lens and labelled "FIRE" in letters at least 12 mm high.
4. Provide visible appliances within 300 mm of each audible appliance as indicated.
5. Visible appliances may be part of audio-visual assembly, where more than two appliances are located in same room or corridor.

2.12 VALVE TAMPER SWITCHES

1. Provide switches to monitor open position of valves controlling water supply to sprinkler systems.
2. Switch contacts to transfer from normal position to off-normal position during first two revolutions of hand wheel or when stem of valve has moved not more than one-fifth of distance from its normal position.
3. Provide switch with tamper resistant cover.
4. Removal of the cover to cause switch to operate into off-normal position.

2.13 CONDUIT

1. Rigid Steel Conduit:
   a. Zinc-Coated.
2. Intermediate Metal Conduit (IMC):
   a. Zinc-coated steel only.
3. Electrical Metallic Tubing (EMT).
4. Surface Metal Raceway and Fittings:
   a. Two-piece painted steel.
   b. Totally enclosed snap-cover type.

2.14 WIRING

1. Wire for 120 V circuits: No. 12 AWG minimum solid copper conductor.
2. Wire for low voltage DC circuits: No. 14 AWG minimum solid copper conductor
3. Wire to remote annunciators: No. 18 AWG minimum solid copper conductor.
4. Wire for connection to base telegraphic alarm loop: No. 12 AWG minimum solid copper conductor.
5. Insulation 75 degrees C minimum with nylon jacket.
6. For underground or wet allocations cable from control panel to auxiliary transmitter and to telegraphic loop: type UF.
7. Colour code wiring.

2.15 AS-BUILT RISER DIAGRAM

1. Fire alarm system riser diagram: in glazed frame on black lamicoid sheet with bevelled edges, white lettering and designations, minimum size 600 x 600 mm.

2.16 ANCILLARY DEVICES

1. Remote relay unit to initiate fan shutdown.

3.0 PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

1. Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.
2. Locate and install manual alarm stations and connect to alarm circuit wiring.
3. Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
4. Connect alarm circuits to main control panel.
5. Locate and install signal bells chimes horns and visual signal devices and connect to signalling circuits.
6. Connect signalling circuits to main control panel.
7. Install end-of-line devices at end of alarm and signalling circuits.
8. Install remote annunciator panels and connect to annunciator circuit wiring.
9. Locate and install door releasing devices.
10. Locate and install remote relay units to control fan shut down.
11. Sprinkler system: wire alarm and supervisory switches and connect to control panel.
12. Room detection system including Halon 1301.
    a. Locate and install detectors. Make necessary connections between room detection panel and main fire alarm panel.
    b. Locate and install audible signals visual alarms.
    c. Locate and install detectors under raised floor. Fasten to steel brackets approximately 300 mm above sub-floor level to clear cables and conduits.
    d. Locate and install gas discharge stations. Connect valves on Halon system to room detection panel.
13. Connect fire suppression systems to control panel.

3.3 FIELD QUALITY CONTROL

1. Site Tests:
   a. Perform tests in accordance with CAN/ULC-S537.
   b. Fire alarm system:
      - Test each device and alarm circuit to ensure manual stations, thermal and smoke detectors, sprinkler system, transmit alarm to control panel and actuate first stage alarm,general alarm and ancillary devices.
      - Check annunciator panels to ensure zones are shown correctly.
      - Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.
      - Class A circuits.
        - Test each conductor on circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
        - Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
      - Class B circuits.
        - Test each conductor on circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
        - Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
2. Manufacturer's Field Services:
   a. Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
   b. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
   c. Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 TRAINING

1. Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

3.5 CLEANING

1. Proceed in accordance with Section 01 74 11 - Cleaning.
2. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

Section 31 00 99– EARTHWORK FOR MINOR WORKS

1 GENERAL

1.01 RELATED REQUIREMENTS

1.02 REFERENCES

.1 ASTM International
- .1 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ftü) (600kN-m/mü).

.2 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.3 CSA International
- .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.4 Ministère des Transports du Québec
- .1 Cahier des charges et devis généraux (CCDG) : infrastructures routières, Édition 2014.

.5 U.S. Environmental Protection Agency (EPA)/Office of Water
- .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Sustainable Design Submittals:
- .1 LEED Canada-NC Version 1.0 Submittals: in accordance with Section 01 35 21 - LEED Requirements.
- .2 Erosion and Sedimentation Control: submit erosion and sedimentation control .
- .3 Construction Waste Management:
  - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.4 Regional Materials: submit evidence that project incorporates required percentage 10% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

2 PRODUCTS

2.01 MATERIALS

.2 Crushed Granular MG20, MG20b, MG56 and sandto CCDG.

.3 Unshrinkable fill: concrete to CSA A23.1/A23.2.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions:

.1 Examine soil report available with the bid

.2 Before commencing work establish locations of buried services on and adjacent to site.

.2 Evaluation and Assessment:

.1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

.2 Testing of materials and compaction of backfill and unshrinkable fill will be carried out by testing laboratory designated by the Correctional Service of Canada and Public Works and Government Services Canada.

.3 Not later than 1 week before backfilling or filling, provide to designated testing agency, 23 kg sample of backfill material proposed for use.

.4 Not later than 48 hours before backfilling or filling with approved material, notify Correctional Service of Canada and Public Works and Government Services Canada representative so that compaction tests can be carried out by designated testing agency.

.5 Before commencing work, conduct, with CSC Representative and CSC, condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

3.02 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
- .1 Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in accordance with requirements of authorities having jurisdiction
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Protection of in-place conditions:
- .1 Protect excavations from freezing.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to CSC's approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are to remain undisturbed.

.3 Removal:
- .1 Remove obsolete buried services within 2 m of foundations. Cap cut-offs.
- .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .3 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.
- .4 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.
- .5 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

3.03 EXCAVATION

.1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.

.2 Do blasting in accordance with Provincial and Municipal regulations. Repair damage to approval of CSC Representative and CSC. No blasting will be permitted within 3 m of any building and where damage would result.

.3 Topsoil stripping:

.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

.2 Strip topsoil to depths CSC. Avoid mixing topsoil with subsoil.

.3 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.

.4 Stockpile in locations CSC Representavive.

.5 Dispose of topsoil CSC off site.

.4 Excavate as required to carry out work, in all materials met.

.1 Do not disturb soil or rock below bearing surfaces. Notify CSC Representavive when excavations are complete.

.2 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.

.3 Fill excavation taken below depths shown without CSC Representavive's written authorization with concrete of same strength as for footings.

.5 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.

.6 Excavate for slabs and paving to subgrade levels.

.1 Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.04 SITE QUALITY CONTROL

.1 Fill material and spaces to be filled to be inspected and approved by CSC Representavive.

3.05 BACKFILLING

.1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from CSC Representavive.

.2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with selected subgrade material compacted as specified for fill.

.5 Placing:
- .1 Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.
- .2 Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.

.6 Compaction: compact each layer of material to following densities for material to ASTM D 698:
- .1 To underside of basecourses: 95%.
- .2 Basecourses: 100%.
- .3 Elsewhere: 90%.

.7 Under slabs and paving:
- .1 Use 400 mm up to bottom of granular base courses.
- .2 Use 200 mm for base courses.

.8 In trenches:
- .1 Up to 300 mm above pipe or conduit: sand placed by hand.
- .2 Over 300 mm above pipe or conduit: native material approved by CSC Representavive.

.9 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

.10 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.

.11 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

.12 Underground tanks: use sand to bottom of granular base courses or to bottom of topsoil, as applicable.

3.06 GRADING

.1 Grade to ensure that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by CSC Representavive. Grade to be gradual between finished spot elevations as indicated.

3.07 CLEANING

.1 Progress Cleaning
  .1 Dispose of cleared and grubbed material off site daily.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

SECTION 32 11 16.01 Granular Sub-base

1 GENERAL

1.01 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

1.02 RELATED REQUIREMENTS

.1 Section .

1.03 MEASUREMENT AND PAYMENT

.1 No measure to take. Price include refection of the surface damaged by work

1.04 REFERENCES

.1 ASTM International
- .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D 422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
- .5 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ftü) (600kN-m/mü).
- .6 ASTM D 1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ftü) (2,700kN-m/mü).
- .7 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .8 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.4 U.S. Environmental Protection Agency (EPA) / Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.06 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Storage and Handling Requirements:
.1 Store materials in accordance withmanufacturer's recommendations erosion and sedimentation control plan.
.2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Granular sub-base material: MG20 in accordance with CCDG 2014
.1 Crushed, pit run or screened stone, gravel or sand. CCDG
.4 Other properties for soil as follows:
.1 Liquid Limit: to ASTM D 4318, Maximum 25.
.2 Plasticity Index: to ASTM D 4318, Maximum 6.
.3 Los Angeles degradation: to ASTM C 131.
.1 Maximum loss by mass: 40 50 %.
.4 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%.
.5 Soaked CBR: to ASTM D 1883, Minimum 40 when compacted to 100% of ASTM D 1557.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for granular sub-base installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of CSC Representative.
- .2 Inform CSC Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from CSC Representative.

3.02 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.03 PLACING

.1 Place granular sub-base after subgrade is inspected and approved by CSC Representative.

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow or ice.

.5 Begin spreading sub-base material on crown line or high side of one-way slope.

.6 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.

.8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
.1 CSC Representative may authorize thicker lifts if specified compaction can be achieved.

.9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.10 Remove and replace portion of layer in which material has become segregated during spreading.

3.04 COMPACTION

.1 Compaction equipment to be capable of obtaining required material densities.

.2 .

.3 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from CSC Representative before use.

.4 Equipped with device that records hours of actual work, not motor running hours.

.5 Compact to density of not less than 98% corrected maximum dry densityASTM D 698
ASTM D 1557.

.6 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.7 Apply water as necessary during compaction to obtain specified density.

.8 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by CSC Representative.

.9 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.06 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 35 21 - LEED Requirements.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 SITE TOLERANCES

.1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.08 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Departmental Representative CSC.

Section 32 12 16.01– Asphalt paving - short form

1 GENERAL

1.01 RELATED REQUIREMENTS

1.02 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

.1 All product must be included in the bid. No product furnish by CSC..

1.03 MEASUREMENT AND PAYMENT

.1 No measurement general cost for the work

1.04 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)
- .1 AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.
- .2 AASHTO R29-08, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
- .3 AASHTO T245-97(2008), Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

.2 Asphalt Institute (AI)
- .1 AI MS-2-1994, Mix Design Methods for Asphalt Concrete and Other Hot-Mixes.

.3 ASTM International
- .1 ASTM C 88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- .2 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ftü (600 kN-m/mü)).

.4 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
- .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .3 LEED Canada 2009 for Design and Construction-2010, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.

.4 LEED Canada for Existing Buildings, Operations and Maintenance-2009, LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

.5 Government of Québec, Transport Québec
.1 Cahier des charges et devis généraux (CCDG) - Infrastructure routières - Construction et réparation, édition 2014.

.6 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.
.1 MPI #32, Traffic Marking Paint, Alkyd.

.7 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C 4 weeks prior to beginning Work.

.3 Samples:
.1 Inform CSC of proposed source of aggregates and provide access for sampling 4 weeks prior to beginning Work.

.4 Sustainable Design Submittals:
.1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.
.2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with EPA 832/R-92-2005 authorities having jurisdiction and Section 01 35 21 - LEED Requirements.
.3 Construction Waste Management:
.1 Submit project Waste Management Plan Waste Reduction Workplan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50 75% of construction wastes were recycled or

salvaged.

.4 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.

.5 Regional Materials: submit evidence that project incorporates required percentage 50 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.06 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with CCDG2014

2 PRODUCTS

2.01 MATERIALS

.1 Aggregates to: CCDG2014

.1 Granulat fin (5mm et moins) type 2a

.2 Granulats grossiers (5 mm et plus) type 2

.3 Granulats bitumineux recyclés max 15%.

.2 Prime coat: RC-30 to CCDG.

.3 Tack coat: SS-1 to CCDG.

.4 Asphalt concrete: to CCDG.

.9 Granular subbase 400 mm MG56

.10 Granular base: 200 mm MG20

.11 Prime coat: EB14 60 mm PG58-28 CCDG

.12 Tack coat: EB10S 60 mm PG58-28 CCDG

.**SPEC NOTE**: Solvent borne paints contain volatile organic compounds (VOCs) such as petroleum distillates. Every year thousands of tonnes of VOCs are released into the atmosphere. These VOCs react with nitrogen oxides in the presence of sunlight to produce ground level ozone and photochemical smog. The use of paints with reduced levels of VOCs will reduce these emissions thereby helping to improve the environment and reduce possible adverse health effects. The

Environmental Choice guideline ECP-76 provides acceptable standards for products that provide reduced environmental impacts.

.15 Traffic paint: yellow and whiteto MPI # 32.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of CSC Representative.
- .2 Inform CSC of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from CSC.

3.02 FOUNDATIONS

.1 Foundations for roadways comprise:
- .1 400 mm compacted thickness of granular subbase MG56
- .2 200 mm compacted thickness of granular base MG20

.3 Compaction: compact each lift of granular material to 100% maximum density to ASTM D 698. Maximum lift thickness: 150 mm.

3.03 PAVEMENT THICKNESS

.1 Pavements for roadways:
- .1 Base course: 60 mm EB14.
- .2 Wear course: 40 mm EB10S

.2 Pavements for parking lots:
- .1 Wear course: 50 mm HL3 MB5.

3.04 PAVEMENT CONSTRUCTION

.1 Surface preparation: CCDG.

.2 Application of prime coat and tack coat: CCDG.

.3 Construction of asphalt concrete: CCDG.

3.05 TRAFFIC MARKINGS

.1 Paint parking space divisions and other pavement markings in accordance with manufacturers recommendations and as indicated.

.2 Use paint thinner in accordance with manufacturer's requirements.

3.06 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal .

Section 32 92 23– Sodding

1 GENERAL

1.01 RELATED REQUIREMENTS

1.03 REFERENCES

.1 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:
- .1 Schedule sod laying to coincide with preparation of soil surface.
- .2 Schedule sod installation when frost is not present in ground.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

.3 Samples.
- .1 Submit:
  - .1 Sod for each type specified.
    - .1 Install approved samples in1 square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.
  - .2 Bio-degradable geotextile fabric.
  - .3 0.5 kg container of each type of fertilizer used.

.2 Obtain approval of samples by CSC Representative.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

.5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.06 QUALITY ASSURANCE

.1 Qualifications:
- .1 Landscape Contractor: to be a Member in Good Standing of Horticultural Trades Association.
- .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
- .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

1.07 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with supplier's recommendations.
- .2 Replace defective or damaged materials with new.

.2 PRODUCTS

2.01 MATERIALS

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
- .1 Turf Grass Nursery Sod types:
  - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.

.2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.

.3 Number One Named Cultivars: Nursery Sod grown from certified seed.

.2 Turf Grass Nursery Sod quality:

.1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.

.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.

.3 Mowing height limit: 35 to 65 mm.

.4 Soil portion of sod: 6 to 15 mm in thickness.

.2 Commercial Grade Turf Grass Nursery:

.1 Mow sod at height directed by CSC within 36 hours prior to lifting, and remove clippings.

.2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.

.3 Sod establishment support:

.1 Geotextile fabric: biodegradable, square mesh.

.2 Wooden pegs: .

.3 Biodegradable starch pegs:.

.4 Water:

.1 Supplied by CSC at designated source.

.5 Fertilizer:

.1 To Canada "Fertilizers Act" and Fertilizers Regulations.

.2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.02 SOURCE QUALITY CONTROL

.1 Obtain written approval from CSC of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from CSC Representative.

3 EXECUTION

3.01 INSTALLERS

.1 Use installers who are Member in Good Standing of Horticultural Trades Association.

3.02 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sod installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of CSC Representative

.2 Inform CSC Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from CSC Representative.

3.03 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - Topsoil Placement and Grading. If discrepancies occur, notify CSC and commence work when instructed by CSC Representative.

.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod and plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.

.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in location as directed by CSC in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

3.04 SOD PLACEMENT

.1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.

.2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.

.3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.4 Roll sod as directed by CSC. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.05 SOD PLACEMENT ON SLOPES AND PEGGING

.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.

.2 Start laying sod at bottom of slopes.

.3 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to following pattern:
- .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
- .2 Not less than 3-6 pegs per square metre.
- .3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by CSC.
- .4 Drive pegs to 20 mm above soil surface of sod sections.

3.06 FERTILIZING PROGRAM

.1 Fertilize during establishment and warranty periods to following program:

3.07 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .1 Clean and reinstate areas affected by Work.

.3 Waste Management: separate waste materials for reuse compost and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 35 21 - LEED Requirements.
- .1 Remove recycling and compost containers and bins from site and dispose of materials at appropriate facility.
- .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by CSC Representative.

3.08 PROTECTION BARRIERS

.1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by CSC.

.2 Remove protection 2 weeks after installation after inspection as directed by CSC Representative.

3.09 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.
- .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
- .2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.
- .3 Maintain sodded areas weed free 95%.
- .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
- .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.10 ACCEPTANCE

.1 Turf Grass Nursery Sod areas will be accepted by CSC provided that:
- .1 Sodded areas are properly established.
- .2 Sod is free of bare and dead spots.
- .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
- .4 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by CSC provided that:
- .1 Sodded areas are properly established.
- .2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.
- .3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.
- .4 Sodded areas have been cut minimum 2 times prior to acceptance.
- .5 Fertilizing in accordance with fertilizer program has been carried out at least once.

.3 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

.4 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

.5 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.11 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:
- .1 Water sodded Turf Grass Nursery Sod and Commercial Grade Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.

.2 Repair and resod dead or bare spots to satisfaction of CSC.

.3 Cut grass and remove clippings that will smother grass as directed by CSC to height as follows:
- .1 Turf Grass Nursery Sod:
  - .1 50 mm during normal growing conditions.
- .2 Commercial Grade Turf Grass Nursery Sod :
  - .1 60 mm during normal growing conditions.
- .3 Cut grass at 2 week intervals or as directed by CSC, but at intervals so that approximately one third of growth is removed in single cut.
- .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
- .5 Eliminate weeds by mechanical or chemical means to extent acceptable to CSC.

Section 33 11 16 Site water utility master construction distribution piping and pipe drilling

1 GENERAL

.1 The duties and responsibilities to be performed by the Contractor are listed below. this list is not exhaustive and restrictive.

The Contractor shall perform all work necessary for the implementation and coordination of all work.

- Production of a work plan including shop drawings.
- Location of adjacent pipes.
- Cleaning the adjacent main pipes.
- Videotaping the site before the work begins.
- Excavation of wells required.
- Carry out the drilling and insert the pipe.
- Connection of the new pipe to the existing pipe.
- Testing.
- Cleaning the new pipe.
- Disinfection of drinking water line.
- Infill wells.
- Restoration the site.

1.01 REFERENCES

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
  .1 ANSI/AWWA B300-10, Standard for Hypochlorites.
  .2 ANSI/AWWA B301-10, Standard for Liquid Chlorine.

.3 ANSI/AWWA B303-10, Standard for Sodium Chlorite.
.4 ANSI/AWWA C104/A21.4-08, Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
.5 ANSI/AWWA C105/A21.5-10, Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
.6 ANSI/AWWA C111/A21.11-07, American National Standard for Rubber-Gasket Joints for Ductile-Iron and Fittings.
.7 ANSI/AWWA C110/A21.10-08, American National Standard for Ductile-Iron and Gray Iron Fittings for Water.
.8 ANSI/AWWA C150/A21.50-08, Standard for Thickness Design of Ductile-Iron Pipe.
.9 ANSI/AWWA C151/A21.51-09, Standard for Ductile-Iron Pipe, Centrifugally Cast.
.10 ANSI/AWWA C153/A21.53-11, Standard for Ductile-Iron Compact Fittings.
.11 ANSI/AWWA C200-05, Standard for Steel Water Pipe - 6 Inch (150 mm) and Larger.
.12 ANSI/AWWA C203-08, Standard for Coal Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied.
.13 ANSI/AWWA C205-07, Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 Inch (100 mm) and Larger - Shop Applied.
.14 ANSI/AWWA C206-11, Standard for Field Welding of Steel Water Pipe.
.15 ANSI/AWWA C207-07, Standard for Steel Pipe Flanges for Waterworks Service, 4 Inch through 144 Inch (100 mm through 3,600 mm).
.16 ANSI/AWWA C208-07, Standard for Dimensions for Fabricated Steel Water Pipe Fittings.
.17 ANSI/AWWA C300-11, Standard for Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.
.18 ANSI/AWWA C301-07, Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.
.19 ANSI/AWWA C303-08, Standard for Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type.
.20 ANSI/AWWA C500-09, Standard for Metal-Seated Gate Valves for Water Supply Service.
.21 ANSI/AWWA C504-10, Standard for Rubber-Seated Butterfly Valves.
.22 ANSI/AWWA C600-10, Standard for Installation of Ductile-Iron Water Mains, and Their Appurtenances.
.23 ANSI/AWWA C602-11, Standard for Cement-Mortar Lining of Water Pipelines - 4 Inch (100 mm) and Larger.
.24 ANSI/AWWA C651-05, Standard for Disinfecting Water Mains.
.25 ANSI/AWWA C800-05, Standard for Underground Service Line Valves and Fittings.
.26 ANSI/AWWA C900-07, Standard for Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 12 Inch (100 mm - 300 mm), for Water Transmission and Distribution.

.2 ASTM International

.1 ASTM A 53/A 53M-10, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.

.2 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM A 307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.4 ASTM B 88M-05(2011), Standard Specification for Seamless Copper Water Tube Metric.

.5 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.6 ASTM C 136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.7 ASTM C 478M-11, Standard Specification for Precast Reinforced Concrete Manhole Sections Metric.

.8 ASTM D 698-07e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ftü (600 kN-m/mü)).

.9 ASTM D 2310-06, Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.

.10 ASTM D 2657-07, Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.

.11 ASTM D 2992-06, Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fitting.

.12 ASTM D 2996-01(2007)e1, Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.

.13 ASTM F 714-10, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

.14 ASTM C 618-08a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

.3 American Water Works Association (AWWA)/Manual of Practice

.1 AWWA M9-2008, Concrete Pressure Pipe.

.2 AWWA M11-2004, Steel Pipe - A Guide for Design and Installation.

.3 AWWA M17-2006, Installation, Field Testing, and Maintenance of Fire Hydrants.

.4 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-NC-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.

.3 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.

.4 LEED Canada-EB: O&M-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.5 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 CAN/CGSB-34.1-94, Pipe, Asbestos Cement, Pressure.
- .4 CGSB 41-GP-25M-77, Pipe, Polyethylene, for the Transport of Liquids.

.6 CSA International
- .1 CAN/CSA-A257 Series-09, Standards for Concrete Pipe (Consists of A257.0, A257.1, A257.2, A257.3 and A257.4).
- .2 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .3 CAN/CSA-B137 Series-09, Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12).
  - .1 CAN/CSA-B137.1-09, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
  - .2 CAN/CSA-B137.3-09, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
- .4 CSA G30.18-09, Carbon and Steel Bars for Concrete Reinforcement.

.7 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.

.8 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S520-07, Standard for Fire Hydrants.
- .2 CAN/ULC-S543-09, Standard for Internal-Lug, Quick Connect Couplings for Fire Hose.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for distribution piping materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Pipe certification to be on pipe.

.2 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province Territory of Quebec Canada.
- .2 Submit complete drawings and construction schedule for water mains 600 mm diameter and larger. Include method for installation of water main.

.3 Drilling equipment:

.1 The list of equipment and material used for drilling must meet the following requirements

Drill

The capacity of the drill should be sufficient to complete both the drilling and operation of draw and a mixing system and drilling fluid circulating sufficient capacity to complete the installation of the pipe without exceeding the capacity voltage of the latter. In the event that the Contractor would advocate the use of a dry drill, the Contractor is not required to use a mixing system and drilling fluid circulation.

Locator

The drilling equipment should also include a drilling head location system to accurately guide the drilling. The location system must be calibrated, installed and operated by qualified and experienced personnel. Operators must know the magnetic and electromagnetic sources can cause failure of the localization system and their impact on opérations.Le location system must be less than 0.6% margin of error regarding the angle attack and 5% compared to the depth

Mechanical

The drill should include a hydraulic system allowing the rotation, the push and pull rods into the ground at a variable angle. During these operations, the pressurized drilling fluid must be continuously injected into the soil through the drilling head with the exception of the dry drilling. All hydraulic systems must be airtight and drill must have a grounding in all operations. When the drill has a lightning warning, it must be kept in operation at all times.

The drill head

The drill head must be steerable and it should be chosen so as to be adapted to the soil conditions encountered.

The reamer

Generally, the reamer will have an equivalent diameter is 1.5 times the outer diameter of the pipe or 300 mm more than the diameter of the pipe that is the smallest. Event, the event or a swelling of the soil is apprehended, the diameter of the reamer to be 25% larger than the value obtained.

All selected equipment must be selected so as to be adapted to the soil conditions encountered.Unless otherwise indicated, the Contractor is solely responsible for the choice of the reamer diameter required to perform the work and the number of passes he must perform to install the pipe. This choice must be consistent with the soil conditions encountered.

The mixer
The system used for the mixture of the drilling fluid is to mix the latter completely and uniformly. Moreover, it must be a capacity which allows a sufficient flow of liquid.
The flow rate and pressure of drilling mud must be controlled so as not to exceed the installed driving skills, limited excavation and limit the possibilities of resurgence of drilling mud to the surface.
The circulation system must be consistent with the type of soil encountered. Its capacity should allow at least the transport of a volume equivalent to the drilling mud soil volume drilled.
The junction between the pump and drilling rods must be watertight.

1.06 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit data to produce record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of air and vacuum release valves, hydrant details.
- .1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants.

.3 Operation and Maintenance Data: submit operation and maintenance data for pipe, valves, valve boxes, valve chambers and hydrants for incorporation into manual.

1.07 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect water distribution piping from nicks, scratches, and blemishes .

.3 Replace defective or damaged materials with new.

1.08 SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services.

.2 Submit schedule of expected interruptions for approval and adhere to interruption schedule as approved by CSC.

.3 Notify CSC building occupants superintendent minimum of 24 hours in advance of interruption in service.

.4 Do not interrupt water service for more than 3 hours and confine this period between 10:00 and 16:00 hours local time unless otherwise authorized.

.5 Notify fire department of planned or accidental interruption of water supply to hydrants.

.6 Provide and post "Out of Service" sign on hydrant not in use.

.7 Advise local police department of anticipated interference with movement of traffic.

1.09 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Tools: provide tools as follows:
- .1 service post wrenches for curb stops.
- .2 hydrant wrenches.
- .3 tee-handle operating keys for valves.

2 PRODUCTS

2.01 PIPE, JOINTS AND FITTINGS

.1 Ductile iron pipe: to ANSI/AWWA C151/A21.51, pressure class for kPa cement mortar lined to ANSI/AWWA C104/A21.4.

.2 Joints and fittings for ductile iron pipe.
- .1 Joints:
  - .1 Push-on joints: to ANSI/AWWA C111/A 21.11.
  - .2 Rubber gasket for mechanical pipe joints: to ANSI/AWWA C111/A21.11.
  - .3 Rubber gasket for flange pipe joints 1.6 mm thick: to ANSI/AWWA C111/A21.11.
  - .4 Bolts, nuts, hex head with washers: to ASTM A 307, heavy series.

.5 Ensure electrical conductivity across joints.

.2 Fittings:

.1 Mechanical joint cast iron and ductile iron fittings NPS 3 and larger: to ANSI/AWWA C110/A21.10.

.2 Flanged cast iron fittings NPS 3 and larger: to ANSI/AWWA C110/A21.10.

.3 Compact Fittings to ANSI/AWWA C153/A21.53.

.3 Reinforced concrete pipe: to CAN/CSA-A257 ANSI/AWWA C300 ANSI/AWWA C301 ANSI/AWWA C303 class .

.1 Pipe joints: flanged to ANSI/AWWA C207 push-on joints with performance requirements to ANSI/AWWA C111/A21.11.

.2 Fitting joints: flanged to ANSI/AWWA C207 push-on with performance requirements to ANSI/AWWA C111/A21.11.

.3 Pipe fittings: reinforced concrete to ANSI/AWWA C301 ANSI/AWWA C303.

.4 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900, pressure class 150, DR 18, 1 MPa gasket bell end, cast iron outside diameter.

.1 CAN/CSA-B137.3, PVC series 160, 1.1 MPa elastomeric gasket coupling.

.2 Composite epoxy impregnated fibreglass PVC pipe to ASTM D 2996, class H. Unplasticized PVC core over wrapped with bonded fibreglass reinforced epoxy resin. Pressure class 300, 2.4 MPa with cast iron outside diameter and integral bell gasketted joints to ANSI/ASTM D2992. Material to ASTM D 2310, classification RTRP-11HZ-5001-PVC-13223.

.3 Cast iron fittings: to ANSI/AWWA C110/A21.10, and for pipe diameters larger than NPS 4 cement mortar lined to ANSI/AWWA C104/A21.4.

.5 Polyethylene pressure pipe:

.1 NPS 1/2 to NPS 6: to CAN/CSA-B137.1 type PE 3406, series 160 ASTM F 714, type PE 3408, series DR 11.

.2 90 mm to 1600 mm: to CGSB 41-GP-25M , type PE 1404, series 250.

.3 Polyethylene to polyethylene joints: to be thermal butt fusion joined, to ASTM D 2657 or flanged with steel aluminum ductile iron backing flanges.

.4 Cast iron fittings with flanged ends: to ANSI/AWWA C110/A21.10 for pipe size above NPS 4, Cement mortar lined to ANSI/AWWA C104/A21.4.

.5 Polyethylene fittings: to CAN/CSA-B137.1, for pipe sizes NPS 4 and less.

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2.02 PIPE PROTECTION

.1 Provide means of protection for iron pipe in corrosive soils in accordance with local practices and authorities having jurisdiction to ANSI/AWWA C105/A21.5.

2.03 VALVES AND VALVE BOXES

.1 Valves to open clockwise counter clockwise .

.2 Gate valves: to ANSI/AWWA C500, standard iron body, brass bronze mounted wedge double disc valves with non-rising stems, suitable for 1 Pa with mechanical flanged push-on grooved type coupling joints.

.3 Butterfly valves: to ANSI/AWWA C504, short body long body, class 1 MPa with mechanical flanged joints.

.4 Underground type indicator valve where indicated. Indicator post to accurately indicate valve open or closed. Valve to be electrically supervised.

.5 Air and vacuum release valves: heavy duty combination air release valves employing direct acting kinetic principle.

- .1 Fabricate valves of cast iron body and cover, with bronze trim, stainless steel floats with shock-proof synthetic seat suitable for 2 MPa working pressure.
- .2 Valves to expel air at high rate during filling, at low rate during operation, and to admit air while line is being drained.
- .3 Valve complete with surge check unit.
- .4 Ends to be flanged to ANSI/AWWA C110/A21.10.

.6 Cast iron valve boxes: bituminous coated screw type three piece sliding type adjustable over minimum of 450 mm complete with valve operating extension rod, 30 mm minimum diameter, 25 x 25 mm cross section, of such length that when set on valve operating nut top of rod will not be more than 150 mm below cover.

- .1 Base to be large round type with minimum diameter of 300 mm.
- .2 Top of box to be marked "WATER"/"EAU".

2.05 SERVICE CONNECTIONS

.1 Ductile iron pipe: to ANSI/AWWA C151/A21.51 pressure class for kPa cement mortar lined to ANSI/AWWA C104/A21.4.

.2 Polyvinyl chloride pressure pipe: to CAN/CSA-B137.3, type 1120 series 160 1.1 MPa.

.3 Polyethylene pressure pipe:

- .1 To CAN/CSA-B137.1, type PE, series 160 ASTM F 714, Type PE, series DR 11.
- .2 90 mm to 1600 mm: to CGSB 41-GP-25M , type PE, series 250.

.4 Copper tubing joints: compression type suitable for 1 MPa working pressure.

.5 PVC joints: solvent welded in accordance with manufacturer's specifications.

.6 Polyethylene pipe joints: thermal butt fusion welded plastic insert type serrated sleeves with four stainless steel screws and band-type clamps per joint.

.7 Joints for ductile iron pipe: push-on joints to ANSI/AWWA C111/A21.11. Rubber gaskets to ANSI/AWWA C111/A21.11. Verify requirement to maintain electrical conductivity between pipes.

.8 Brass corporation stops: red brass to , compression type having threads to ANSI/AWWA C800.

.9 Brass inverted key-type curb stops: red brass to ASTM B 62, compression type with without drains.

.1 Curb stops to have adjustable bituminous coated cast iron service box with stem to suit depth of bury.

.2 Top of cast iron box marked "WATER"/"EAU".

.10 Polyethylene tapping tees or multi-saddle tees: for Polyethylene pipe. Tees to be socket fused to pipe.

.11 Service connections for PVC pipe:

.1 Service connections less than 100 mm: corporation stop, tapped to main using AWWA threads, complete with stainless service saddle. Service saddle to consist of circumferential band type complete with side bars and fingers, keeper bar, stud bolts, nuts, washers and gaskets.

.2 Service connections 100 mm and over: use tee fitting or tapping valve and sleeve.

.12 Bronze type service clamps: for PVC pipe service connections.

.1 Service clamps to be of strap-type, with confined "O" ring seal cemented in place.

.2 Clamps to be tapped with threads to ANSI/AWWA C800.

.13 Tee connections: for services above NPS 1. Tee connections to be fabricated of same material and to same standards as specified pipe fittings and to have ends matching pipe to which they are joined.

2.07 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular material to: Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed stone MG20b to CCDG

2.08 BACKFILL MATERIAL

.1 As indicated. Type 3, in accordance with Section 31 00 99 Backfilling.

2.09 PIPE DISINFECTION

.1 Sodium hypochlorite Calcium hypochlorite Liquid chlorine Sodium chlorite to ANSI/AWWA B300ANSI/AWWA B301 ANSI/AWWA B303 to disinfect water mains.

.2 Disinfect water mains in accordance with ANSI/AWWA C651.

3 EXECUTION

3.01 EXAMINATION AND REQUIREMENTS

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for distribution piping installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of CSC Representative .
- .2 Inform CSC Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from CSC Representative.
- .4 The Contractor shall, before and during the execution of the work, to locate underground services of Bell Canada, gas, Hydro-Quebec and cable distribution, municipal services, etc., and notify the responsible agencies the location of these units. The Contractor can not claim from the prime contractor under the pretext that these utilities are not well indicated on the drawings.
- .5 The Contractor shall locate, before the start of the work, all branches of service that must cross with a probe inserted into the connection. If for reasons beyond its control, the Contractor can not locate the entry with the probe, it will do so either by pneumatic excavation by hand or using any other method approved by CSC.
  When the new pipe runs parallel to within 1.5 meters an existing underground infrastructure, the contractor must release said conduct is pneumatically excavation, excavating by hand, or any other method recognized by the CSC representative to locate specifically about every 30 meters along the route.
- .6 The Contractor shall provide on site, a foreman with a year of experience and having participated in the installation of 10 km of pipe that will ensure the proper execution of the work. The representative of the Contractor shall have the ability to receive instructions and to make decisions on behalf of the Contractor.
  The Contractor shall provide a local phone number or Representative is available outside normal working hours to respond to emergencies. It must be available 24 hours a day to respond to complaints related to the work.

3.02 PREPARATION

.1 Clean pipes, fittings, valves, hydrants, and appurtenances of accumulated debris and water before installation.

.1 Inspect materials for defects to approval of Departmental Representative Departmental RepresentativeCSC.

.2 Drilling fluids Management Plan

The following information must be provided in the fluid management plan drilling:

List of additives to be used and their material safety data sheet for safe use.
Identification of the source of water used for mixing of the drilling fluid.
Method used to hold the drilling muds.
Method used to recycle the drilling fluid and cuttings (if applicable).
Method used to remove the debris from the site.
Site disposal of drilling muds.
Before the installation, remove water or debris that may have accumulated inside the pipe, fittings, valves, hydrants and other related equipment.

.1 Check the equipment carefully to detect defects and have it approved by CSC Representative

.2 Remove defective hardware site.

3.03 TRENCHING

.1 Do trenching work in accordance with Section 31 00 99

.2 Ensure trench depth allows coverage over pipe of 2.0 m minimum from finished grade or as indicated.

.3 Trench alignment and depth require Departmental Representative's and CSC's approval prior to placing bedding material and pipe.

3.04 GRANULAR BEDDING

.1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of mm below bottom of pipe to depth as indicated.

.2 Do not place material in frozen condition.

.3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.

.4 Shape transverse depressions in bedding as required to suit joints.

.5 Compact each layer full width of bed to 95% minimum of corrected maximum dry density 95% maximum density to ASTM D 698.

.6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 00 99 with compacted bedding material compacted type 3 fill lean mix concrete.

3.05 PIPE INSTALLATION

.1 Terminate building water service 1 m outside building wall at property line opposite point of connection to main.
- .1 Install coupling necessary for connection to building plumbing.
- .2 If plumbing is already installed, make connection; otherwise cap or seal end of pipe and place temporary marker to locate pipe end.

.2 Lay pipes to ANSI/AWWA C600 ANSI/AWWA M-9 M-11 and manufacturer's standard instructions and specifications.
- .1 Do not use blocks except as specified.

.3 Join pipes in accordance with ANSI/AWWA C600 ANSI/AWWA C602 ANSI/AWWA C206 AWWA M-9 M-11 and manufacturer's recommendations.

.4 Bevel or taper ends of PVC pipe to match fittings.

.5 Handle pipe by methods approved by CSCrecommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.

.6 Lay pipes on prepared bed, true to line and grade.
- .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .2 Take up and replace defective pipe.
- .3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.

.7 Face socket ends of pipe in direction of laying. For mains on grade of 2% or greater, face socket ends up-grade.

.8 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.

.9 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.
- .1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.10 Position and join pipes with equipment and methods approved by CSC.

.11 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.12 Align pipes before jointing.

.13 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.14 Avoid displacing gasket or contaminating with dirt or other foreign material.
- .1 Remove disturbed or contaminated gaskets.
- .2 Clean, lubricate and replace before jointing is attempted again.

.15 Complete each joint before laying next length of pipe.

.16 Minimize deflection after joint has been made.

.17 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.

.18 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by CSC.

.19 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.

.20 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.

.21 Do not lay pipe on frozen bedding.

.22 Do hydrostatic and leakage test and have results approved by CSC before surrounding and covering joints and fittings with granular material.

.23 Backfill remainder of trench.

3.09 UNDERCROSSING

.1 Excavate working pit to dimensions indicated, outside right-of-way facility to be crossed.

.2 Excavate working pit to not less than 0.6 m below lowest invert of encasing pipe.

.3 Dewater excavation.

.4 Dewater area of undercrossing.

.5 Install heavy timber steel frame backstop.

.6 Place encasing pipe to exact line and grade indicated. Encasing pipe to cross under obstruction at an angle of degrees.

.7 Install encasing pipe by jacking boring tunnelling.

.8 Ensure encasing pipe is not in tension.

.9 Joints for encasing pipe: mechanical welded type.

.10 Place concrete grout levelling pad in encasing pipe. Control level of grout during placing.

.11 Insert water main into encasing pipe, in end with largest open area, after placement of levelling pad.

.12 Use approved blocking method to guide water main in true alignment.

.13 Clearance between blocks and encasing pipe: maximum 15 mm when water main is in position.

.14 Join water main one length at time outside encasing pipe. Push Pull water main into position.

.15 Couplings of water main shall not rest on levelling pad when water main is in position.

.16 Place concrete cradle around water main after it is positioned. Cradle to be minimum of 225 mm and maximum of 300 mm above levelling pad.

.17 Pressure grout remaining void, with 850 kPa, maximum pressure with mixture of 1 part Portland cement and 2 parts clean washed sand, with only sufficient water added to allow placing. Do not use additives.

3.10 SERVICE CONNECTIONS

.1 Terminate building water service 1 m outside building wall at property line opposite point of connection to main.
- .1 Install coupling necessary for connection to building plumbing.
- .2 If plumbing is already installed, make connection, otherwise cap or seal end of pipe and place temporary marker to locate pipe end.

.2 Do not install service connections until satisfactory completion of hydrostatic and leakage tests of water main.

.3 Construct service connections at right angles to water main unless otherwise directed. Locate curb stops 300 mm insideright-of-way roadway allowance.

.4 Tappings on ductile iron, asbestos cement or PVC-C900 pipe, may be threaded without service clamps.

.1 Double strap service connections with galvanized malleable iron body and neoprene gasket cemented in place may be used.

.2 Tappings on asbestos-cement must use double strap service clamps.

.3 Tappings for asbestos cement or PVC-C900 pipe to conform to following:

Pipe Diameter (mm)	Maximum Tap Without Clamp (mm)	Maximum Tap With Clamp (mm)
100	20	25
150	20	40
200	25	50
250	25	50
300	40	75

.5 Maximum dried direct tappings (mm) for ductile iron pipe to conform to:

Nominal Pipe Size (mm)	Pressure Class/Max. 150	200	250	300	350
75	-	-	-	-	19
102	-	-	-	-	19
152	-	-	-	-	25
203	-	-	-	-	25
254	-	-	-	-	25
305	-	-	-	-	32
356	-	-	32	38	38
406	-	-	38	50	50
457	-	-	50	50	50
508	-	-	50	50	50
610	-		50	50	50	50
762	50	50	50	50	50

.6 Tappings on PVC pipe to be either PVC valve tees or bronze type service clamps, strap type with "O" ring seal cemented in place.

.7 Tappings for PE pipe: PE tapping tees or multi-saddle tees.

.8 Employ only competent workmen equipped with suitable tools to carry out tapping of mains, cutting and flaring of pipes.

.9 Install single and multiple tap service connections on top half of main, between 45 degrees and 90 degrees measured from apex of pipe.

.10 Install multiple corporation stops, 30 degrees apart around circumference of pipe and minimum of 300 mm apart along pipe.

.11 Tap main at 2:00 o'clock or 10:00 o'clock position only; not closer to joint nor closer to adjacent service connections than recommended by manufacturer, or 1 m minimum, whichever is greater.

.12 Leave corporation stop valves fully open.

.13 In order to relieve strain on connections, install service pipe in "Goose Neck" form "laid over" into horizontal position.

.14 Install rigid stainless steel liners in small diameter plastic pipes with compression fittings.

.15 Install curb stop with corporation box on services NPS 2 or less in diameter.
- .1 Equip larger services with gate valve and cast iron box.
- .2 Set box plumb over stop and adjust top flush with final grade elevation.
- .3 Leave curb stop valves fully closed.

.16 Place temporary location marker at ends of plugged or capped unconnected water lines.
- .1 Each marker to consist of 38 x 89 mm stake extending from pipe end at pipe level to 600 mm above grade.
- .2 Paint exposed portion of stake red with designation "WATER SERVICE LINE" in black.

construction.

3.11 DIRECTED DRILLING

.1 Installation and working method

The Contractor is required to select the appropriate mode of fusion, welding or assembly of driving and follow all manufacturer's recommendations regarding these tasks.

The Contractor is responsible to perform the following checks:

Respect the minimum bend radius of the pipe according to the manufacturer's recommendations.

Ensure that the maximum tensile force on the pipe is never exceeded to avoid stretching the plastic pipe.

Ensure that the pipe does not undergo runout exceeds the manufacturer's recommendations following its installation.

When required by the manufacturer, remove all deposits of ice or snow inside the end of the pipes and make sure the surface to merge or assemble shows no impurities or defects that could prevent the proper jointing. In the case of polyethylene pipes, the surface should be cleaned properly with a type of grease GENESOLV 200 or similar approved by the manufacturer.

For pipe polyethylene or PVC having grooves on the surface of the pipe, it will be necessary to conduct an audit of 10% rejection criterion. After the establishment of a polyethylene or PVC pipe inside the opening, the work of Master should check on a minimum length of 1.5 meters if there is damage to the pipe. Also, when possible, a visual check must be made during the the excavations carried out (connections pose, sliced localization of foreign structures). If the conduct of polyethylene or PVC has a groove or damage which the depth is greater than 10% of the minimum thickness of the wall, it must eliminate that section of the network and replace it with another section of conduite. when a steel pipe is used, similar standards should be used depending on the application and coating.

The Contractor shall provide evidence that the operator has trained with the equipment in question is described by the manufacturer of the pipe.

.2 Welding

The steel pipes are joined by welding the two ends of pipes. Welding should be done according to the manufacturer's recommendations and the supporting standards of the Canadian Welding Bureau.

.3 Assembly

PVC pipes are joined by the assembly according to the type of conduct and the type of joint.

.4 Fusion driving

The Contractor shall ensure that the prime contractor representative is advised when performing all work merger between polyethylene pipes and be present during any merger transaction. In addition, A copy of the merger procedures must be provided to CSC representative before the

work begins.

Any merger must be done by a team of at least two (2) people. The fusion of polyethylene pipes is typically carried out by fusing the end to end or electrofusion. If necessary, the Contractor shall proceed with the merger under a shelter, to avoid dust from the road and the environment.

No merger should be carried out at ambient temperatures below -15°C (5°f). In this case, a shelter must be built for all merger and it must be heated to maintain the ambient temperature above the prescribed temperature.

.5 Fusion butt

This technique involves heating two polyethylene pipe ends which are held against a hot plate until it reaches the temperature necessary for fusion. Thereafter, both heated ends are attached against each other and held in place according to the manufacturer's recommendations to cooling.

When the method by butt fusion is used to assemble the polyethylene pipe, the Contractor shall perform such work in accordance with the requirements of ASTM D2657 entitled "STANDARD PRACTICE FOR HEAT OF FUSION JOINING PIPE AND FITTINGS POLYOLEFIN."

The witness seal serves as a quality indicator for all mergers end to end of a working day when there will be a merger. A joint witness must be tested and accepted by the représentaut CSC at the beginning of each day of fusion.

The joint control is to be approximately 150 mm long on each side of the seal merged by 2.5 cm up to 1.5 times the thickness of the pipe wall in width. A merger with a visual inspection does not indicate the presence of defects exceeding the manufacturer's recommendations can be used as a joint witness. The witness seal may be rejected by the CSC representative if, after the fatigue test, there is the presence of cracks or separation in the merger.

For reference, for smaller diameter pipes or equal to 200 mm, a quality test on butt joints should follow the manufacturer's recommendations and in the presence of the representative of CSC.

.6 Electrofusion

Connecting operation of two (2) pieces of polyethylene of which is an electrofusion fitting with an electronic sequencer.

Merger procedures should be provided to CSC representative for approval.

For the method of electrofusion, to consider constraints in the art with respect to the alignment and the tangential forces applied to the joints.

Electrofusion is allowed only for connections and should never be used when drawing the line.

.7 Materials Abandonment in drilling and drilling sentence

If it is necessary to abandon equipment (directional head, steel rods) in the boreholes, the Contractor is responsible for replacing at its own expense.

If it is necessary to condemn the drilling, the Contractor shall take the necessary measures to prevent subsidence. If necessary, it must fill the space with concrete fill. If a second drill should be run near an existing borehole, a minimum distance depending on the soil conditions to be agreed between the authorized laboratory and CSC.

.8 Drilling fluids management

The Contractor shall provide for the excavation of a well at the beginning and end of the drilling to contain drilling muds and cuttings settling. These wells shall be of sufficient size to contain the anticipated volumes of sludge and debris.

In the case where contaminated soil is discovered during work, drilling mud will be tested to determine a suitable layout method. The method of disposal must be approved by CSC

The Contractor shall take all necessary precautions to prevent any migration of drilling mud into the sewers, drains and waterways.

The Contractor shall follow up drilling mud recovered to note any changes in soil conditions encountered that are likely to harm the progress of work.

.9 Resurgence

During the implementation of the pilot hole and during all stages of drilling, the Contractor shall monitor the surface to detect any sign of resurgence or uprising. The Contractor shall notify the CSC representative when there is a resurgence of drilling mud to the surface when drilling muds do not return to the well or when there is back parasites liquids.

3.12 THRUST BLOCKS AND RESTRAINED JOINTS

.1 For thrust blocks: do concrete Work with 25 Mpa concrete in accordance with CSA A23.1.

.2 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as indicated or as directed by CSC.

.3 Keep joints and couplings free of concrete.

.4 Do not backfill over concrete within 24 hours after placing.

.5 For restrained joints: only use restrained joints approved by CSC.

3.13 HYDROSTATIC AND LEAKAGE TESTING

.1 Do tests in accordance with ANSI/AWWA C600.

.2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.

.3 Notify CSC at least 24 hours in advance of proposed tests.
.1 Perform tests in presence of CSC.

.4 Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used.

.5 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by CSC.

.6 Upon completion of pipe laying and after CSC has inspected Work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated as directed by CSC.

.7 Leave hydrants, valves, joints and fittings exposed.

.8 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.

.9 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.

.10 Open valves.

.11 Expel air from main by slowly filling main with potable water.

.1 Install corporation stops at high points in main where no air-vacuum release valves are installed.

.2 Remove stops after satisfactory completion of test and seal holes with plugs.

.12 Fill asbestos cement pipe and concrete pipe at least 24 hours before testing to allow water absorption by pipe material.

.13 Thoroughly examine exposed parts and correct for leakage as necessary.

.14 Apply hydrostatic test pressure of kPa minimum based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 1 hour.

.15 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.

.16 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.

.17 Repeat hydrostatic test until defects have been corrected.

.18 Apply leakage test pressure of 850 kPa minimum after complete backfilling of trench, based on elevation of lowest point in main and corrected to elevation of gauge, for period of 2 hours.

.19 Define leakage as amount of water supplied from water storage tank metre in order to maintain test pressure for 2 hours.

.20 Do not exceed allowable leakage of L/mm of pipe, including lateral connections.

.21 Locate and repair defects if leakage is greater than amount specified.

.22 Repeat test until leakage is within specified allowance for full length of water main.

3.14 PIPE SURROUND

.1 Upon completion of pipe laying and after CSC has inspected Work in place, surround and cover pipes as indicated.

.2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

.3 Place layers uniformly and simultaneously on each side of pipe.

.4 Do not place material in frozen condition.

.5 Compact each layer from pipe invert to mid height of pipe to at least 95% of corrected maximum dry density 95% maximum density to ASTM D 698.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 90% of corrected maximum dry density to ASTM D 698.

3.15 BACKFILL

.1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

.2 Do not place backfill in frozen condition.

.3 Under paving and walks, compact backfill to at least 95% corrected maximum dry density ASTM D 698.

.1 In other areas, compact to at least 90% corrected maximum dry density to ASTM D 698.

3.18 FLUSHING AND DISINFECTING

.1 Flushing and disinfecting operations: under direct control of witnessed by CSC and CSC carried out by specialist contractor local water work department.

.1 Notify CSC at least 4 days in advance of proposed date when disinfecting operations will begin.

.2 Flush water mains through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.

.3 Flushing flows as follows:

Pipe Size NPS	Flow (L/s) Minimum
6 and below	38
8	75
10	115
12	150

.4 Provide connections and pumps for flushing as required.

.5 Open and close valves, hydrants and service connections to ensure thorough flushing.

.6 When flushing has been completed to CSC approval, introduce strong solution of chlorine as approved by CSC into water main and ensure that it is distributed throughout entire system.

.7 Disinfect water mains. Specialist contractor to perform disinfection. Disinfect water mains to the requirements of local authority.

.8 Rate of chlorine application to be proportional to rate of water entering pipe.

.9 Chlorine application to be close to point of filling water main and to occur at same time.

.10 Operate valves, hydrants and appurtenances while main contains chlorine solution.

.11 Flush line to remove chlorine solution after 24 hours.

.12 Measure chlorine residuals at extreme end of pipe-line being tested.

.13 Perform bacteriological tests on water main, after chlorine solution has been flushed out.
- .1 Take samples daily for minimum of 2 days.
- .2 Should contamination remain or recur during this period, repeat disinfecting procedure.
- .3 Specialist contractor to submit certified copy of test results.

.14 Take water samples at hydrants and service connections, in suitable sequence, to test for chlorine residual.

.15 After adequate chlorine residual not less than 50 ppm has been obtained leave system charged with chlorine solution for 24 hours.
- .1 After 24 hours, take further samples to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.

3.19 SURFACE RESTORATION

.1 After installing and backfilling over water mains, restore surface to original condition as directed by CSC.

3.20 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 35 21 - LEED Requirements.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

Client: Correctional Service Canada – Sainte-Anne des Plaines
Project: CSC Automatic Sprinkler Systems Upgrade
List of plans

Date: April 17th, 2015
Ref. Client: 550-2-343-3927

Mechanical:

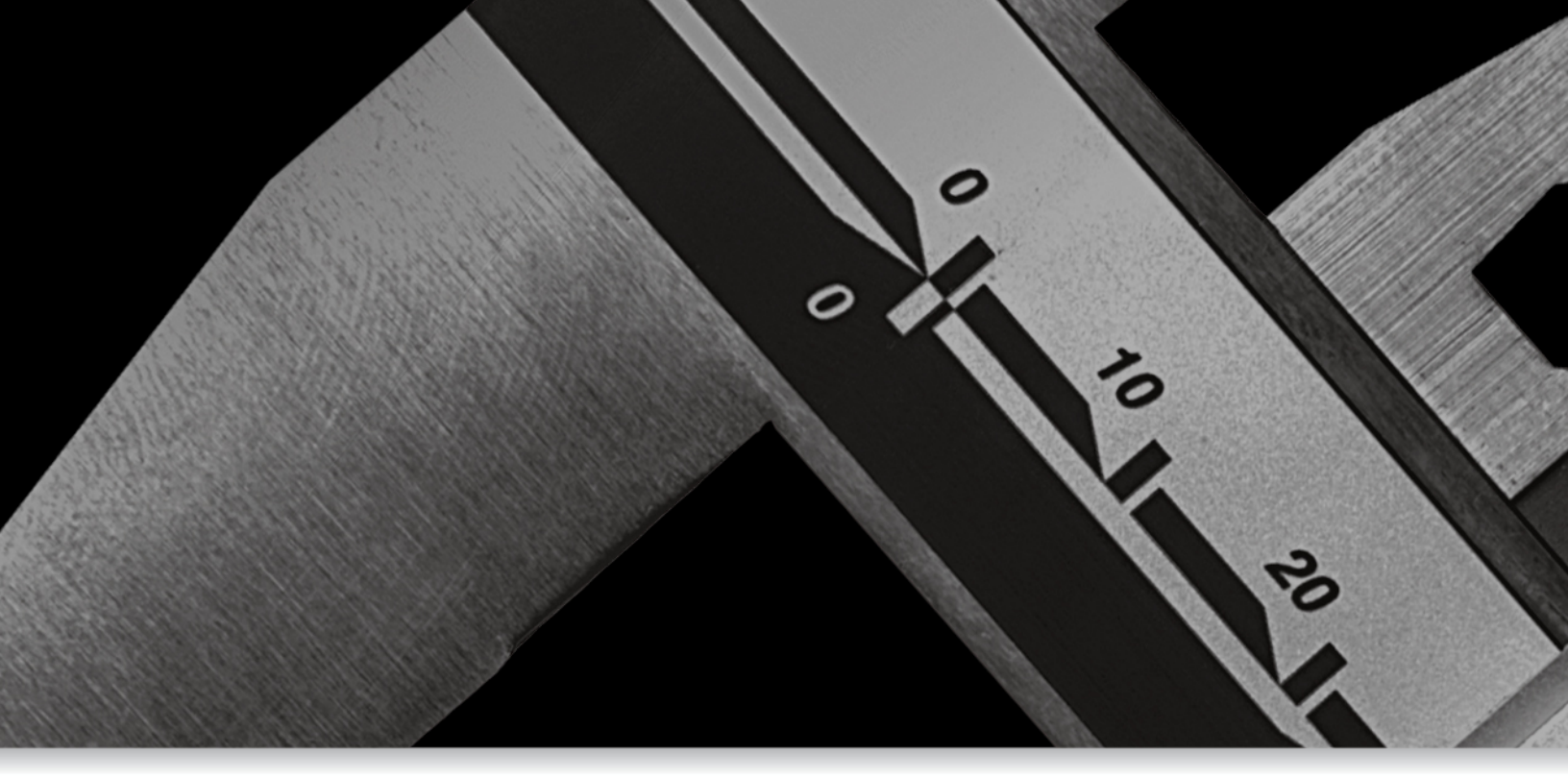
550_2_343_3927-M01-LEG-SYM
550_2_343_3927-M02-DWE-DEM-CON
550_2_343_3927-M03-SPK-CON
550_2_343_3927-M04-SPK-CON
550_2_343_3927-M05-SPK-CON
550_2_343_3927-M06-SPK-DET
550_2_343_3927-M07-SPK-CAL

Electrical:

550_2_343_3927-E01-LEG-SYM
550_2_343_3927-E02-FIR-ALM
550_2_343_3927-E03-ZON

Civil :

GEN14-251-02



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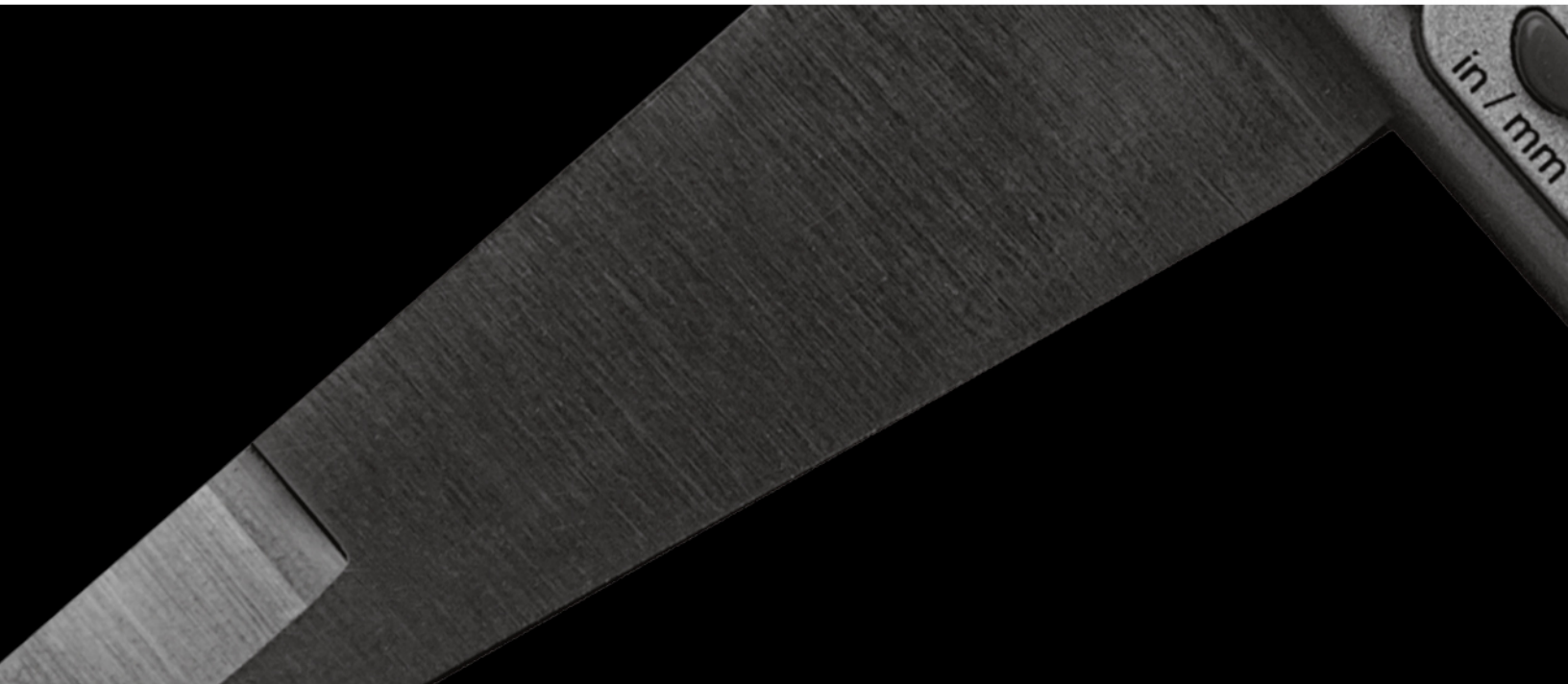
INGÉNIERIE ET SOLUTIONS

RAPPORT : M029648-A1

SERVICE CORRECTIONNEL CANADA
Projet 343-3023 – Aménagement du Pavillon « A », phase II
246, Montée Gagnon
Sainte-Anne-des-Plaines, Québec

13 août 2012



INSPEC-SOL
INGÉNIERIE ET SOLUTIONS

Montréal, le 13 août 2012

Monsieur Stéphane Fortin
Gestionnaire de projets
Services techniques régionaux
Établissement La Macaza
Service correctionnel Canada
Sécurité publique Canada
321, chemin de l'Aéroport
La Macaza (Québec) J0T 1R0

Objet : Rapport d'étude géotechnique
Référence no M029648-A1
Projet 343-3023 – Aménagement du Pavillon « A », phase II

Monsieur Fortin,

C'est avec plaisir que nous vous transmettons notre rapport d'étude géotechnique M029648-A1 concernant la deuxième phase de votre projet d'aménagement du Pavillon « A » au centre de détention de Sainte-Anne-des-Plaines.

Nous vous remercions d'avoir retenu les services techniques et professionnels d'Inspec-Sol et nous espérons avoir le privilège de vous servir à nouveau dans le futur.

Notre objectif sera toujours de vous offrir un service à la mesure de vos attentes!

N'hésitez pas à communiquer avec nous pour tout renseignement complémentaire en composant le (514) 333-5151.

Veuillez croire, Monsieur, à l'expression de nos sentiments les meilleurs.

INSPEC-SOL INC.

Éric Boulanger, ing., M.Sc.
Vice-président

EB/hs

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INGÉNIERIE ET SOLUTIONS

SERVICE CORRECTIONNEL CANADA

Étude géotechnique
Projet 343-3023 – Aménagement Pavillon « A », phase II
246, Montée Gagnon
Sainte-Anne-des-Plaines, Québec

Date : **Le 13 août 2012**	Réf. : **M029648-A1**

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SERVICE CORRECTIONNEL CANADA
321, chemin de l'Aéroport
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Étude géotechnique
Projet 343-3023 – Aménagement Pavillon « A », phase II
246, Montée Gagnon
Sainte-Anne-des-Plaines, Québec

N/Réf. : M029648-A1
Le 13 août 2012

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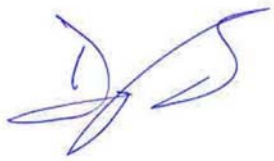

David Beauseigle, ing. jr

Approuvé par :

Éric Boulanger, ing., M.Sc.

Distribution : Service Correctionnel Canada - M. Stéphane Fortin
(Copie par courriel : stephane.fortin@csc-scc.gc.ca et par poste)

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TABLE DES MATIÈRES

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TABLE DES MATIÈRES (SUITE)

1.0 Introduction

Les services professionnels d'Inspec-Sol inc. (**Inspec-Sol**) ont été retenus par Monsieur Stéphane Fortin, gestionnaire de projets de Service Correctionnel Canada (SCC), pour effectuer une étude géotechnique en vue de l'aménagement du pavillon « A » du centre de détention situé au 246, Montée Gagnon à Sainte-Anne-des-Plaines, Québec.

L'envergure de l'étude réalisée est décrite dans notre offre de services professionnels portant le numéro PA-29412-1, datée du 10 mai 2012 et adressée à Monsieur Fortin.

Les travaux de sondage effectués dans le cadre de l'étude avaient pour but de déterminer la nature et les caractéristiques géotechniques des sols au site retenu pour le projet, afin d'émettre des recommandations concernant la capacité portante des matériaux présents, le type de fondations à envisager, la préparation des assises granulaires pour les dalles sur sol, ainsi que le contrôle des eaux souterraines.

Dans le cadre de l'étude géotechnique, un certain nombre d'échantillons de sol ont par ailleurs été sélectionnés et soumis à des analyses chimiques de façon à évaluer sommairement la qualité environnementale des matériaux présents sur le site dans l'optique de la gestion des déblais d'excavation lors des travaux d'aménagement du site. Ces analyses environnementales ne correspondent pas à une caractérisation du terrain.

Ce rapport rend compte des travaux effectués sur le site, présente les résultats obtenus et contient des recommandations et des commentaires relativement à la conception des fondations et à la construction du projet précité.

Le texte du rapport est accompagné d'une série de quatre (4) annexes où l'on retrouve successivement un plan de localisation du site (annexe 1), le rapport de forage (annexe 2), les résultats des essais de laboratoire (annexe 3), ainsi que les certificats d'analyses chimiques (annexe 4).

Ce rapport est assujetti à un certain nombre de conditions limitatives découlant de la nature inhérente aux profils géologique, géotechnique et hydrogéologique de tout site faisant l'objet d'investigations par sondages. La portée de l'étude réalisée et les limitations qui s'y appliquent sont énoncées à la fin du texte technique. Ces conditions limitatives font partie intégrante de ce rapport et le lecteur est prié d'en prendre connaissance afin de faciliter sa compréhension, son interprétation et son utilisation du présent document.

2.0 Localisation et description du site

Le centre de détention de Sainte-Anne-des-Plaines est situé au 246, Montée Gagnon. Le Pavillon « A » faisant l'objet de l'agrandissement est situé dans la partie sud-ouest de l'établissement.

L'emplacement où le forage a été réalisé est dans le coin intérieur du côté nord du bâtiment, formé par trois murs extérieurs des bâtiments existants du Pavillon « A » et du bloc administratif (« B »).

Le terrain à cet endroit est gazonné et montre une pente descendante vers l'ouest, ayant un dénivelé de l'ordre de 1,2 m.

3.0 Méthodes de reconnaissance

3.1 Travaux d'arpentage

Un plan du site à l'étude, préparé par Boudrias et Légaré Architectes, portant le numéro A1 et daté de février 2012, nous a d'abord été transmis par le client.

Ce plan a servi de document de base à notre personnel technique pour procéder à l'implantation et au positionnement du forage sur le site à investiguer. L'implantation au sol du forage a ainsi été établie à l'aide de mesures prises à partir des repères physiques existants (bâtiments existants).

L'élévation de la surface du sol à l'emplacement du sondage et aux autres points indiqués a également été mesurée par notre personnel technique, à partir d'un repère de nivellement temporaire, représenté par le dessus d'un boulon du lampadaire situé au nord-ouest de l'agrandissement projeté. Pour les fins du présent rapport, une élévation arbitraire de 50 m a été assignée à ce point.

3.2 Travaux de sondage

Les travaux de sondage ont consisté en l'exécution d'un (1) forage stratigraphique, localisé dans l'emprise de l'agrandissement projeté. Le plan no M029648-A1-1, joint à l'annexe 1, illustre la localisation de ce sondage sur le site.

Le programme de sondages (nombre, emplacements, et profondeurs) a été établi par **Inspec-Sol**.

Le forage a été effectué au moyen d'une foreuse à tarières évidées (CME-55), montée sur un chenillard, et a atteint une profondeur de 9,89 m. Lors de son exécution, des échantillons de sols ont été récupérés à intervalle régulier, en utilisant une cuillère fendue standard de calibre B. La cuillère fendue permet aussi d'obtenir des informations sur la compacité des couches de sol traversées, en obtenant des valeurs de pénétration appelées indices «N», correspondant à l'essai de pénétration standard («SPT»). Les indices de pénétration mesurés renseignent sur la capacité portante admissible des sols en place. Des échantillons non remaniés ont aussi été récupérés au sein du dépôt d'argile, au moyen de tubes à paroi mince de type Shelby, pour fins d'analyses plus approfondies en laboratoire.

Un profil scissométrique a également été réalisé sur le site, au moyen d'un scissomètre de chantier de marque Nilcon. Le scissomètre sert à mesurer la résistance au cisaillement non drainé de l'argile en place. Finalement, à la suite de l'échantillonnage du forage, un essai de pénétration dynamique a été réalisé pour le compléter.

Des notes explicatives relativement aux rapports de sondages, à la description des unités stratigraphiques et à la méthodologie des essais in situ sont présentées à l'annexe 2 de ce rapport.

Les travaux de chantier ont été réalisés le 15 juin 2012, sous la supervision constante d'un membre de notre personnel technique.

3.3 Travaux de laboratoire

Un certain nombre d'échantillons représentatifs des sols en place ont été sélectionnés afin de procéder à quelques analyses et essais en laboratoire :

- trois (3) déterminations de la teneur en eau naturelle;
- deux (2) déterminations des limites de consistance;
- un (1) essai de consolidation oedométrique.

Ces essais ont été réalisés afin de compléter les informations recueillies au chantier et dans le but de déterminer les paramètres de compressibilité du dépôt d'argile. Les résultats des essais sont présentés à la section 4, de même qu'à l'annexe 3.

Tous les échantillons de sol recueillis lors des travaux de sondage ont été acheminés à notre laboratoire, afin d'être soumis à un examen visuel plus approfondi et à différents essais et analyses. Ils seront conservés pour une période de six mois à partir de la date d'émission de ce rapport, après quoi nous en disposerons à moins d'avis contraire de la part du client.

4.0 Description sommaire des sols

Le forage a révélé des matériaux de remblai se prolongeant jusqu'à 2,40 m de profondeur, reposant sur le sol naturel composé d'un dépôt argileux. La description détaillée des conditions de sol rencontrées est présentée au rapport de sondage joint à l'annexe 2, et les sections suivantes décrivent également chacune des unités rencontrées.

4.1 Matériaux de remblai

Des matériaux de remblai ont été rencontrée jusqu'à une profondeur de 2,40 m (élévation 48,48 m). En surface, le remblai est composé d'un silt sableux brun avec des traces de gravier, humide et lâche. Sous 0,6 m de profondeur, le remblai est plutôt constitué d'un silt contenant un peu de sable à partir de 0,6 m de profondeur.

Sous-jacent à cette couche silteuse, laquelle se prolonge jusqu'à 1,2 m de profondeur (élévation 49,68 m), une criblure de pierre a été rencontrée. Des inclusions de silt argileux sont observées au sein de cette criblure.

4.2 Argile silteuse

Sous-jacent au remblai, un dépôt d'argile silteuse a été rencontré à 2,40 m de profondeur (élévation 48,48 m). Jusqu'à 3,0 m de profondeur (élévation 47,88 m), le dépôt est humide et raide, correspondant à la « croûte argileuse ». Sous cette « croûte », l'argile silteuse devient saturée et de consistance ferme, avec des résistances au cisaillement non drainé mesurées au moyen du scissomètre variant entre 35 kPa et 48 kPa. On peut considérer que le niveau de la nappe d'eau souterraine se situe approximativement à 3 m de profondeur (élévation 47,88 m).

Le tableau suivant présente les limites de consistance et les paramètres de compressibilité du dépôt d'argile, tels qu'obtenus lors des essais de laboratoire :

Tableau no 1 : Propriétés du dépôt argileux

Sondage no		**F-01**	**F-01**	**F-01**
Échantillon no		**CF-5**	**TM-8**	**TM-10**
Profondeur (m)		**2,40 – 3,00**	**3,00 – 3,60**	**6,09 – 6,65**
Teneur en eau naturelle	W (%)	50	60	68
Limite de plasticité	w_P (%)	--	27	22
Limite de liquidité	w_L (%)	--	89	61
Indice de plasticité	I_P (%)	--	62	39
Indice de liquidité	I_L (%)	--	0,53	1,18
Indice des vides initial	e_0	--	2,11	--
Poids volumique initial	γ (kN/m^3)	--	15,5	--
Indice de compression	c_c	--	2,07	--
Indice de recompression	c_r	--	0,1135	--
Contrainte de préconsolidation	σ'_P (kPa)	--	170	--
Contrainte effective verticale initiale	σ'_{vo} (kPa)	--	66	--
Rapport de surconsolidation	OCR	--	2,6	--

Basé sur ces résultats, il s'agit d'une argile à plasticité élevée de type « CH », selon la classification unifiée des sols (USCS), dont la teneur en eau naturelle sous la croûte se rapproche de la limite de liquidité du dépôt.

De plus, basé sur l'essai de consolidation œdométrique, on note que le dépôt est actuellement surconsolidé, avec un rapport de surconsolidation (OCR) de 2,6.

Suite à l'échantillonnage, un essai de pénétration dynamique a été réalisé, lequel a atteint un refus franc à 21,28 m de profondeur (élévation 29,60 m).

5.0 Analyses chimiques des sols pour fins de disposition

Dans le cadre de la présente étude, des échantillons de sols ont été prélevés pour fins d'analyses chimiques. Le personnel technique d'**Inspec-Sol** était responsable de la manipulation des divers échantillons. Une procédure rigoureuse de gestion conforme au *Guide d'échantillonnage à des fins d'analyses environnementales* du ministère du Développement durable, de l'Environnement et des Parcs (MDDEP), a été suivie lors du prélèvement, de l'identification, de l'entreposage temporaire et du transport des échantillons, de façon à assurer leur conservation et leur intégrité jusqu'à leur acheminement au laboratoire analytique.

Deux (2) échantillons de sols prélevés dans le forage a été soumis à des analyses chimiques pour le dépistage des hydrocarbures pétroliers (C_{10} à C_{50}), des hydrocarbures aromatiques polycycliques (HAP), et de treize (13) métaux (argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, zinc).

Les analyses chimiques ont été réalisées par le laboratoire *Maxxam Analytique inc.* (Maxxam) qui est reconnu et accrédité par le MDDEP. Elles ont été effectuées selon les directives du *Guide des méthodes de conservation et d'analyses des échantillons d'eau et de sol* du MDDEP. Les certificats des analyses chimiques préparées par Maxxam sont joints à l'annexe 4 du rapport.

À des fins de gestion des sols excavés, les résultats des analyses chimiques ont été interprétés selon la *Grille des critères génériques pour les sols* de la *Politique de protection des sols et de réhabilitation des terrains contaminés* du MDDEP et selon les valeurs limites du *Règlement sur l'enfouissement des sols contaminés* (RESC) du MDDEP. Le tableau suivant présente la classification environnementale des échantillons de sols en fonction des résultats des analyses chimiques réalisées et des critères génériques :

Tableau no 2 : Classification environnementale des sols

Échantillon no	Profondeur (m)	Paramètres analysés		
		C10 à C50	HAP	Métaux
F-01 / CFE-2	0,61 – 1,22	< A	< A	A – B
F-01 / CFE-4	1,83 – 2,44	< A	< A	A – B

Le critère générique « A » est le seuil à partir duquel des restrictions peuvent être imposées lorsque des sols sont excavés. Les sols classés « A – B » qui seront excavés devront être gérés selon les dispositions de la Grille du MDDEP.

Les analyses chimiques des échantillons ont été réalisées uniquement afin de pouvoir déterminer le lieu de disposition des sols qui seront excavés et, par conséquent, la présente section ne peut pas être considérée comme étant une étude de caractérisation environnementale du site.

La classification environnementale des sols a été déterminée à partir des résultats d'analyses chimiques effectuées sur un nombre limité d'échantillons. Lors de la réalisation du projet, il est donc possible qu'un site récepteur exige des analyses supplémentaires (échantillons ou paramètres) avant d'accepter des sols excavés pour disposition.

La nature et le degré de contamination des sols entre les points d'échantillonnage peuvent varier par rapport aux conditions rencontrées à l'endroit où ont été prélevés les échantillons analysés, tels que choisis par l'ingénieur-conseil du client. Compte tenu de la nature souvent très ponctuelle et hétérogène des phénomènes de contamination environnementale, les conclusions de l'échantillonnage s'appliquent uniquement aux endroits sondés. Les conclusions générales portant sur l'ensemble du site sont fournies à titre indicatif et sur une base probabiliste.

L'interprétation environnementale des résultats d'analyses présentés dans ce rapport réfère aux critères environnementaux en vigueur au moment de l'étude et applicables au site étudié. Les niveaux de contamination présentés dans ce rapport doivent être considérés valides uniquement à la période où les échantillonnages ont été réalisés puisque ces niveaux peuvent varier suite à des activités humaines subséquemment entreprises sur le site investigué ou sur des sites adjacents.

6.0 Recommandations et commentaires

6.1 Description du projet

La deuxième phase d'aménagement du Pavillon « A » prévoit notamment un agrandissement d'environ 52 m^2, adjacent à trois (3) murs existants. Il s'agit d'un agrandissement d'un (1) étage avec un « vide sanitaire », dont la dalle est prévue à environ 2,8 m de profondeur.

Rappelons qu'il existe une différence d'élévation d'environ 1 m sur le site ; nous avons considéré la profondeur d'assise par rapport à la partie élevée du terrain, à l'emplacement où le forage a été réalisé, c'est-à-dire à une élévation approximative de 48,08 m.

Basé sur les plans transmis, le bâtiment du côté est de l'agrandissement n'a pas de sous-sol, et le bâtiment à l'ouest de l'agrandissement a un sous-sol d'environ 2 m de profondeur. De plus, selon les informations transmises par le client, les fondations des bâtiments existants mitoyens à l'agrandissement prévu reposent sur des pieux.

Basé sur notre connaissance du projet et sur les résultats obtenus à l'emplacement du sondage de même que lors des essais de laboratoire, et assumant que ces résultats sont représentatifs de l'ensemble de la stratigraphie du site, les recommandations et commentaires suivants sont présentés :

6.2 Travaux d'excavation

Selon les informations transmises, le niveau de la dalle du « vide sanitaire » sera à environ 2,8 m de profondeur par rapport à la partie élevée du terrain actuel, dans l'emprise de l'agrandissement projeté.

Basé sur la stratigraphie du site, ces excavations seront réalisées à travers des sols de remblai et pénétreront vraisemblablement le dépôt d'argile.

À titre indicatif, des pentes de talus non supportées de l'ordre de 1V : 1H peuvent être envisagées pour assurer la stabilité de tranchées temporaires dans les matériaux de remblai. Dans l'argile, des pentes adoucies à 1V : 2H devront être réalisées.

Les parois devront être recouvertes de membranes imperméables afin de prévenir l'érosion et le développement d'instabilités locales, et les déblais d'excavation devront être déposés à une distance minimale équivalente à la profondeur de l'excavation.

Toute pente d'excavation non supportée devra être ajustée en fonction des conditions réelles du terrain (densité des sols, présence d'eau, de débris, évidence d'instabilités locales, etc.) rencontrées lors de l'excavation. Leur réalisation de façon stable et sécuritaire durant les travaux demeure en tout temps la responsabilité de l'entrepreneur.

Rappelons que les fondations des bâtiments mitoyens à l'agrandissement reposent sur pieux, et que des précautions devront être prises lors des travaux d'excavation sous les têtes de pieux, afin d'éviter de les abîmer et également afin d'éviter une instabilité des dalles sur sol des bâtiments existants, si elles sont de types « conventionnelles ».

6.3 Fondations

6.3.1 Fondations profondes

Compte tenu que les fondations des bâtiments existants prennent appuis sur des pieux, et afin d'éviter les tassements différentiels entre les structure existantes et le nouvel agrandissement, un système de fondations profondes, consistant en des pieux agissant en friction et en pointe est recommandé pour ce projet.

Bien que divers types de pieux puissent être utilisés pour supporter l'agrandissement projeté, des pieux en acier tubés ou profilés en « H » battus au refus presque au roc peuvent être envisagés pour ce projet.

La capacité axiale ultime géotechnique des pieux devrait être déterminée selon la méthode β donnée à la section no 18.2.1.1 du *Manuel canadien d'ingénierie des Fondations*, 2005, 4ème édition, en utilisant les paramètres donnés dans le tableau suivant :

Tableau no 3 - Paramètres géotechniques

Type de sol	Poids volumique (kN/m^3)	Poids volumique déjaugé (kN/m^3)	Coefficient β	Facteur de capacité portante, Nt
Remblai	18,0	8,2	0,5	--
Argile	15,2	5,4	0,3	--
Roc	--	--	--	250

Le niveau d'eau souterraine devra être établi à 3,0 m de profondeur pour ces calculs. Un coefficient de résistance géotechnique de 0,4 devra être appliqué à la capacité axiale ultime pour la conception géotechnique des pieux.

Les longueurs moyennes de pieux seront également fonction du type exact de pieux choisis (diamètre, forme de la pointe, etc.) et du critère de refus à l'enfoncement déterminé par le concepteur. Une charge de travail admissible devra donc être établie par ce dernier.

Afin de valider les valeurs de la conception géotechnique, les critères de conception et les niveaux de refus, il est recommandé de procéder à quelques essais dynamiques sur des pieux présélectionnés, au moyen d'un analyseur d'ondes installé sur les pieux à tester, lors du battage de ces derniers. Ces essais permettront de confirmer la charge admissible des pieux qui a été établie lors de la conception.

Le tassement anticipé pour une structure sur pieux est habituellement négligeable et devrait résulter de la compression élastique des pieux eux-mêmes. La valeur de tassement des pieux sous les charges maximales mortes et vives de la structure devra être confirmée par les essais de chargement.

Toutes les têtes de pieux extérieures devront être placées à une profondeur d'au moins 1,4 m sous la surface du terrain pour être à l'abri des effets de gel.

6.3.2 Fondations conventionnelles

Bien que les fondations des bâtiments existants prennent appui sur des pieux, le terrain étudié se prête à l'utilisation de fondations conventionnelles, de type semelles filantes et/ou isolées, pour reprendre les charges qui seront transmises au sol par la structure projetée. Il pourrait donc être envisagé de faire appel à des fondations conventionnelles, pour des raisons économiques.

Toutefois, le long des murs mitoyens avec les bâtiments existants, il est recommandé de prévoir un joint de construction entre les structures, pour prendre en compte les tassements différentiels à anticiper entre les structures existantes et l'agrandissement projeté.

Les semelles devront reposer au sein du dépôt d'argile silteuse rencontré sous les matériaux de remblai.

Dans ces conditions de fondation, une capacité portante admissible nette ou à l'état limite d'utilisation (ÉLUT) de 50 kPa pourra être utilisée pour des semelles filantes ou isolées mesurant 3 m de largeur ou moins. Il est recommandé de ne pas utiliser de semelles de moins de 760 mm de largeur.

La valeur susmentionnée devra également inclure, s'il y a lieu, tout poids de remblai additionnel (c'est-à-dire en excès des niveaux actuels) apporté sur le site ainsi que les charges mortes et vives provenant de la dalle sur sol. Ainsi, si le site est rehaussé, un poids volumique de 18 kN/m^3 peut être considéré pour le calcul de charge additionnelle.

Sous des contraintes n'excédant pas les valeurs de capacité portante à l'état limite d'utilisation (ÉLUT) ci-dessus, les tassements total et différentiel des semelles ne devraient pas dépasser 25 mm et 19 mm respectivement, sous réserve que les surfaces d'assise au niveau des semelles soient sèches et libres de toute boue et de tout sol remanié avant de procéder au bétonnage.

Le calcul de la capacité portante à l'état limite ultime (ÉLUL) des semelles doit tenir compte de l'inclinaison et de l'excentricité de la résultante des charges, de même que de la dimension et la profondeur des semelles; étant donné que ces informations ne sont présentement pas connues, cette valeur devra être calculée par le concepteur selon la formule donnée à la section 10.2 du « Canadian Foundation Engineering Manual, 4^{e} édition, 2006 » (CFEM). Les paramètres géotechniques suivants sont recommandés pour ce calcul :

Tableau no 4 : Calcul de la capacité portante à l'ÉLUL

Paramètre	Argile silteuse
Poids volumique effectif (γ') (kN/m³)	5,4
Cohésion non-drainée Cu (kPa)	35
Angle de friction interne ϕ'(°)	26
Cohésion effective c' (kPa)	3

Un coefficient de pondération de la résistance de 0,5 devra être appliqué à la capacité portante à l'ÉLUL pour la conception.

Toutes les fondations périphériques devront être construites à une profondeur minimale de 1,4 m sous le niveau final du terrain extérieur (le long du périmètre du bâtiment) pour être à l'abri des effets de la pénétration du gel dans le sol.

Compte tenu de la présence de conduits électriques dans l'emprise de l'agrandissement projeté, il est également à mentionner qu'aucune fondation ne pourra s'appuyer sur des servitudes souterraines et des mesures structurales spéciales devront être prises, si tel est le cas.

6.4 Catégorie d'emplacement

Dans la mesure où les fondations conventionnelles seront mises en place à environ 2,8 m de profondeur, reposant sur le dépôt argileux dont la résistance au cisaillement est inférieure à 50 kPa, sur moins de 30 m d'épaisseur, une catégorie d'emplacement du site « **E** » selon le Tableau 4.1.8.4.A du CNB 2005 pourra être utilisée pour la conception.

6.5 Dalle sur sol

Une dalle sur sol conventionnelle, c'est-à-dire structuralement séparée des murs de fondation et des colonnes, peut être utilisée dans le cadre de ce projet.

Il est recommandé de prévoir la mise en place d'une couche de pierre concassée certifiée « DB » de calibre 20-0 mm immédiatement sous la dalle, à titre de fondation pour cette dernière. L'épaisseur de pierre concassée recommandée est de 300 mm. Cette couche devra être densifiée à 95 % de la densité maximale sèche du matériau obtenue à l'essai Proctor modifié. Il est également recommandé de prévoir un polyéthylène entre le remblai granulaire et la nouvelle dalle de béton, ainsi qu'une membrane géotextile entre le remblai granulaire et les sols naturels argileux.

6.6 Contrôle des eaux souterraines

6.6.1 Court terme – lors de la construction

Nous ne prévoyons pas de problème majeur d'eau souterraine lors des travaux de construction. Toutefois, des infiltrations causées par des eaux de ruissellement ou par des nappes d'eau occluses au sein des couches superficielles de sol pourraient survenir au cours des excavations, dépendant des conditions climatiques et/ou de la période de l'année à laquelle les travaux seront réalisés.

Nous sommes d'avis que les venues d'eau devraient pouvoir être éliminées au moyen de tranchées et de pompes judicieusement placées, c'est-à-dire en périphérie des fouilles, près des sources d'infiltration.

6.6.2 Long terme

Pour ce qui est du drainage à long terme, des mesures doivent être prises afin de se prémunir contre le développement possible de poussées hydrostatiques et l'apparition de problèmes connexes, tels que venues d'eau, etc., qui pourraient survenir durant la vie utile du bâtiment.

À cette fin, il est recommandé d'imperméabiliser les murs de fondation périphériques au moyen d'un enduit ou d'une membrane approprié et aussi de prévoir l'installation de systèmes de drains français autour des fondations extérieures. Ces drains seront reliés à des puisards ou fosses de captage construits aux emplacements adéquats.

6.7 Recommandations générales de construction

6.7.1 Sensibilité du sol au remaniement

Compte tenu de sa teneur élevée en particules fines, le dépôt sous-jacent au site sera extrêmement sensible au remaniement causé par les intempéries (pluie, gel, fonte des neiges) ou par la circulation des ouvriers et de la machinerie de chantier. Un remaniement excessif des surfaces d'assise pourrait entraîner une perte de résistance des sols et, subséquemment, des tassements dépassant l'amplitude prévue.

6.7.2 Surveillance et inspections des travaux

Il est recommandé de faire inspecter les travaux de fondation par un personnel compétent en géotechnique, qui s'assurera que les semelles sont placées sur les strates appropriées et non remaniées, capables de supporter les pressions de la structure dans des conditions sécuritaires.

Les opérations de remblayage et de compactage devraient également faire l'objet d'un suivi approprié, de façon à s'assurer que des matériaux conformes soient employés et que les degrés de compactage demandés soient effectivement atteints.

6.7.3 Effets de la végétation ou d'un rabattement phréatique

Les activités de construction et d'aménagement paysager peuvent influencer fortement l'amplitude et la profondeur des déplacements observés dans les sols. Il est bien reconnu depuis plusieurs années que les sols argileux peuvent se consolider (tasser) de façon importante s'ils perdent leur humidité (teneur en eau) lors d'une période de sécheresse prolongée ou d'un rabattement de nappe causé par des racines d'arbres.

Le client doit être conscient de cette éventualité et doit éviter de planter des arbres ayant tendance à développer un réseau radiculaire important (principalement des arbres feuillus) à faible distance de la structure projetée.

Une règle empirique simple veut que «la distance à conserver entre un arbre et un bâtiment construit sur un dépôt d'argile contractile doit être supérieure à la hauteur probable que pourrait atteindre l'arbre».

6.7.4 Conditions hivernales

La pénétration du gel dans le sol peut causer des problèmes aux structures. Pendant la construction, les sols de fondation exposés doivent être convenablement protégés contre les effets du gel au moyen de matériaux isolants, tels que de la paille, de l'isolant rigide, ou des abris chauffés.

De plus, afin de permettre une transition entre les remblais granulaires peu gélifs et les sols naturels généralement plus susceptibles au gel et ainsi minimiser l'amplitude des soulèvements différentiels sous l'action du gel, il est important d'excaver les tranchées de servitudes en prévoyant des pentes de talus appropriées dans la zone d'influence du gel.

7.0 Portée et limitations de l'étude

Le présent rapport s'adresse exclusivement à **Service Correctionnel Canada** et aux autres parties identifiées explicitement dans ce rapport et l'utilisation de celui-ci par une tierce partie est interdite, sans le consentement écrit d'**Inspec-Sol** au préalable. En émettant le présent rapport, **Inspec-Sol** affirme être l'auteure de l'étude géotechnique pour le projet tel que décrit. Ce rapport est un document professionnel et doit demeurer la propriété exclusive d'**Inspec-Sol**. Toute réutilisation ou redistribution non autorisée du rapport constitue un risque qui incombe uniquement au Client et à son destinataire et pour lequel **Inspec-Sol** ne peut être tenue responsable. Le Client assumera la responsabilité de défendre, d'indemniser, ainsi que de dégager **Inspec-Sol** de toute responsabilité résultant de la distribution non autorisée du rapport par le Client. Le rapport doit être pris comme un tout et doit inclure tous les plans et annexes correspondants. Aucune partie du rapport ne peut être utilisée séparément.

Les recommandations formulées dans ce rapport sont basées sur notre compréhension actuelle du projet ainsi que sur l'utilisation, la topographie et les conditions actuelles du site, de même que sur la portée du mandat accordé par le Client et décrit dans le rapport. L'étude a été effectuée conformément aux règles et aux méthodes généralement reconnues par les professionnels en géotechnique qui pratiquent dans les mêmes conditions et la même région, et aucune autre interprétation n'est permise. Tout usage que pourrait en faire une tierce partie ou toute décision basée sur son contenu, prise par cette tierce partie, est la responsabilité de cette dernière.

Tous les détails de conception et de construction sont rarement connus à la fin de l'étude géotechnique, et peuvent être modifiés en cours de projet. Les commentaires et recommandations présentés dans le rapport sont basés sur les résultats de notre étude et compréhension du projet tels que définis au moment de l'étude. Les services d'**Inspec-Sol** devraient être retenus pour revoir ces recommandations et commentaires lorsque les plans et devis seront terminés. Sans cette révision, **Inspec-Sol** ne pourra être tenue responsable de tout malentendu par rapport aux recommandations ou à l'application et à l'adaptation de celles-ci dans la conception finale.

Il est recommandé que les services d'**Inspec-Sol** soient retenus durant la construction de toutes les fondations et durant les travaux de terrassement afin de s'assurer que les conditions du sous-sol sont similaires à celles observées durant l'étude et que nos recommandations sont bien comprises à toutes les étapes de construction.

Il est important de souligner qu'une étude géotechnique consiste en un échantillonnage aléatoire et ponctuel d'un site et que les commentaires et recommandations inclus dans ce rapport sont basés sur les résultats obtenus aux emplacements des sondages uniquement. Les conditions géologiques présentées sont celles qui ont été observées au moment de la réalisation des sondages et peuvent toutefois être modifiées de façon significative par des travaux de construction (excavation, drainage, dynamitage, fonçage de pieux) sur le site ou sur les sites adjacents. Elles peuvent aussi être modifiées par l'exposition des sols et du roc à l'humidité, au séchage ou au gel. Les conditions de sol et d'eau souterraine entre les sondages et au-delà de l'endroit investigué peuvent varier autant en plan qu'en profondeur par rapport aux résultats obtenus à l'emplacement des sondages. De plus, certaines conditions qui n'ont pu être observées ou prévues au moment de l'étude pourraient être rencontrées durant la construction.

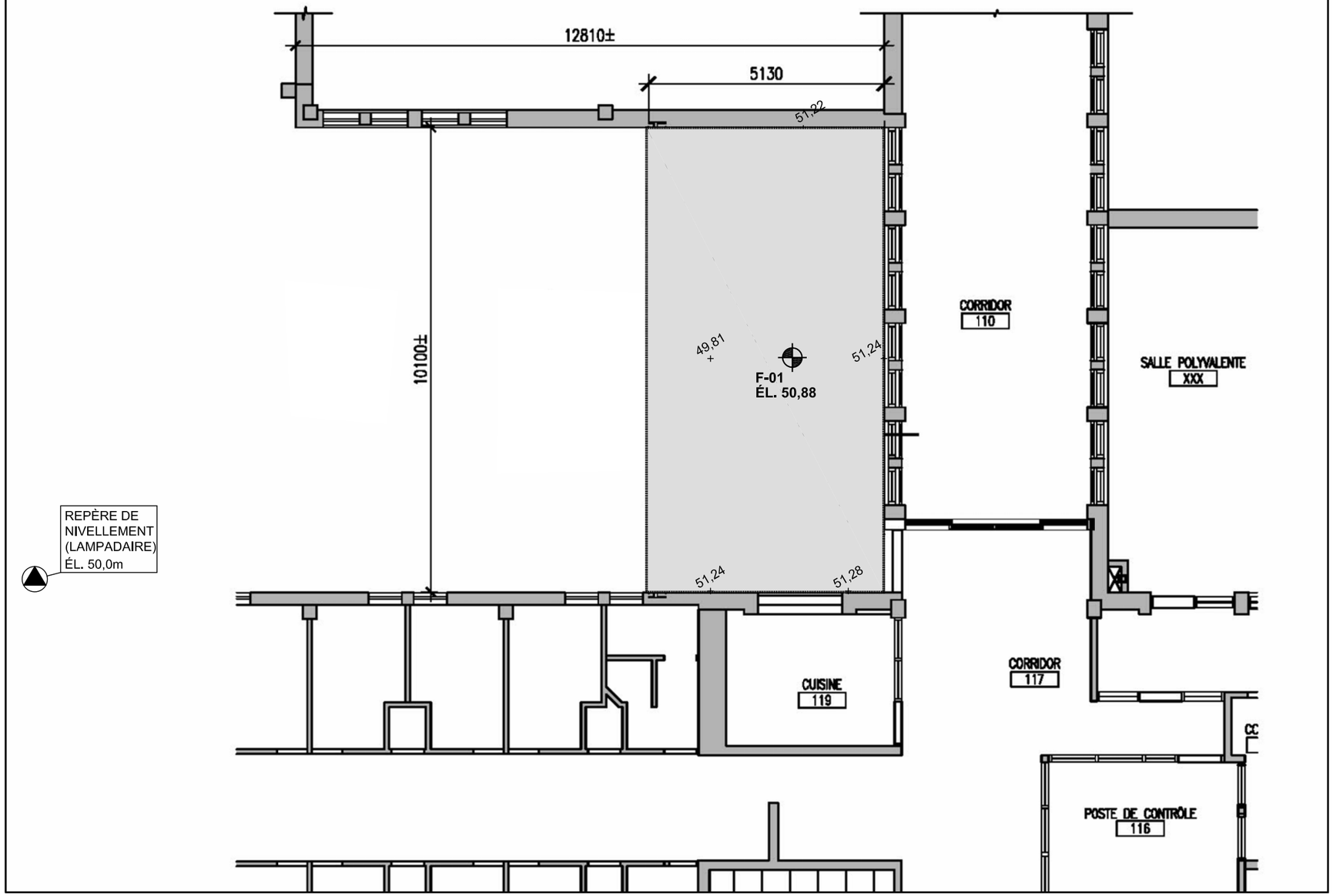
Dans l'éventualité où les conditions rencontrées sur le site devaient différer de celles observées à l'emplacement des sondages, nous demandons d'être immédiatement avisés par écrit afin de permettre une réévaluation de nos recommandations. Si des conditions différentes sont identifiées durant la construction, sans égard au degré d'importance des changements, les recommandations émises dans le présent rapport seront considérées comme invalides jusqu'à ce que ces changements soient évalués par **Inspec-Sol** et que les conclusions du rapport soient modifiées en conséquence ou maintenues par écrit.

DB/hs

p.j.

Annexe 1

- Plan de localisation



PLAN CLÉ

LÉGENDE

- F-01 ÉL. 50,88 — FORAGE, NUMÉRO ET ÉLÉVATION DE LA SURFACE DU SOL (m)
- +51,28 — ÉLÉVATION DE LA SURFACE DU SOL (m)
- AGRANDISSEMENT PROJETÉ

ÉCHELLE GRAPHIQUE:

1 0 5 m

NOTE:
TOUTES LES INFORMATIONS RELATIVES AUX CONDITIONS EXISTANTES DU SITE ET AUX AMÉNAGEMENTS PROJETÉS PROVIENNENT D'UN PLAN DATÉ DE FÉVRIER 2012, FOURNI PAR BOUDRIAS & LÉGARÉ, ARCHITECTES.

INSPEC·SOL
INGÉNIERIE ET SOLUTIONS

SERVICE CORRECTIONNEL DU CANADA
ÉTUDE GÉOTECHNIQUE
PROJET 343-3023 - AMÉNAGEMENT PAVILLON "A", PHASE II
246, MONTÉE GAGNON, STE-ANNE-DES-PLAINES, QUÉBEC

LOCALISATION DU FORAGE

DESSINÉ PAR:	ÉCHELLE:	RÉFÉRENCE NO:
G.S.	1:100	M029648–A1
VÉRIFIÉ PAR:	DATE:	DESSIN NO:
D.B./É.B.	AOÛT 2012	**M029648-A1-1**

Annexe 2

- Rapport de sondage

A- Prélèvement d'échantillons

Les échantillons de sol sont généralement récupérés dans les forages au moyen soit d'un échantillonneur de type cuillère fendue ou à l'aide de tubes d'acier à paroi mince de type «Shelby». La cuillère fendue procure des échantillons de sol remaniés mais représentatifs de la nature des sols en place. L'enfoncement de l'échantillonneur permet également la réalisation simultanée de l'essai de pénétration standard qui est décrit à la section suivante. Les tubes à paroi mince sont enfoncés délicatement dans le sol et permettent la récupération d'échantillons non remaniés au sein des dépôts argileux, ce qui ne peut être le cas avec la cuillère fendue. Les échantillons de roc sont prélevés au moyen de tubes carottiers munis de trépans diamantés et procurent des échantillons sous forme de carottes dont les diamètres varient en fonction du calibre de l'outil utilisé.

B- Essai de pénétration standard («SPT»)

L'essai de pénétration standard consiste à enfoncer dans le sol un échantillonneur normalisé de type cuillère fendue au moyen d'un marteau de 140 lb (63,5 kg) qui le percute après une chute libre de 30 po (76 cm). L'échantillonneur est ainsi foncé dans le sol sur une distance de 18 po (45 cm) et le nombre de coups de marteau nécessaire à l'enfoncement est noté pour chaque intervalle de 6 po (15 cm). Le nombre de coups requis pour enfoncer les derniers 12 po (30 cm) correspond à l'indice de pénétration standard («N»). L'essai est répété à intervalle régulier et les indices obtenus sont des valeurs caractéristiques à partir desquelles on peut estimer la densité, la compressibilité et la résistance des différentes couches de sol traversées. (La procédure est peu applicable cependant aux dépôts argileux).

C- Essai de pénétration dynamique

L'essai de pénétration dynamique est similaire à l'essai de pénétration standard, sauf que l'échantillonneur est remplacé par une pointe conique de 10 cm^2 de surface. Le nombre de coups est noté de façon continue pour chaque pi (30 cm) d'enfoncement et les résultats obtenus donnent un relevé systématique de la densité relative des matériaux traversés. L'essai permet également de révéler la profondeur d'une couche de sol très dense ou parfois du socle rocheux.

Note : La présence de particules grossières, telles que de gros graviers, des cailloux ou des blocs au sein des couches de sol peut affecter les résultats de l'essai de pénétration standard ou dynamique en produisant des valeurs de résistance anormalement élevées. Dans certains cas, la pénétration peut même devenir impossible et un refus «R» est alors noté.

D- Essai de résistance au cisaillement

L'essai de résistance au cisaillement non drainé est réalisé en introduisant dans un sol argileux non remanié un scissomètre constitué de 4 palettes en forme de croix, et en mesurant, à partir de la surface, le couple (force de rotation) nécessaire pour cisailler une surface cylindrique. L'essai est répété à différentes profondeurs et les valeurs de couple obtenues sont converties pour déterminer les résistances au cisaillement non drainé pour chacun des essais effectués. Les profils de résistance recueillis permettent de calculer la capacité portante admissible des dépôts d'argile. L'appareil utilisé pour effectuer les mesures est du type «Nilcon», d'origine scandinave.

E- Essai de perméabilité (LeFranc)

Cet essai consiste à déterminer le coefficient de perméabilité K du sol autour d'une poche perméable (la lanterne) de dimensions connues qui a été formée sous le sabot de battage. La méthode retenue est celle à niveau d'eau variable descendant. Les essais de type LeFranc sont réalisés dans des sols à granulométrie moyenne et à perméabilité moyenne.

F- Essai d'eau sous pression

L'essai d'eau sous pression dans le rocher à palier de pression unique a pour objectif de déterminer le débit d'eau que peut absorber une zone définie de la masse rocheuse pour un palier de pression unique. Cet essai est exécuté afin d'apprécier l'absorptivité du rocher à l'intérieur de zones définies d'un trou de forage effectué dans le cadre d'une reconnaissance géotechnique. L'essai consiste à injecter de l'eau dans une zone de la masse rocheuse définie par une cavité cylindrique de longueur et de diamètre connus et réalisée par forage. Les débits d'eau absorbés sont mesurés pour une pression unique et pour des durées d'injection définies.

G- Essai au pressiomètre Ménard

L'essai pressiométrique, développé par Ménard (1956), est un essai de chargement latéral effectué dans un forage par dilatation d'une sonde cylindrique. L'essai permet de déterminer des caractéristiques effort-déformation du sol, et en particulier le module pressiométrique E_M, et la pression limite p_l, qui mesurent la résistance du sol et peuvent être utilisés pour évaluer la capacité portante et le tassement des fondations.

INSPEC•SOL

NOTES EXPLICATIVES SUR LES RAPPORTS DE SONDAGES

DESCRIPTION DES SOLS:

Chacune des couches de mort-terrain est décrite selon la terminologie d'usage énumérée ci-après. La compacité des sols granulaires est définie par la valeur de l'indice de pénétration standard "N", et la consistance des sols cohérents par la résistance au cisaillement non drainé à l'état non remanié (Cu).

CLASSIFICATION (SYSTÈME UNIFIÉ)

Argile	< 0,002mm		
Silt	0,002 à 0,075mm		
Sable	0,075 à 4,75mm	fin	0,075 à 0,425mm
		moyen	0,425mm à 2,0mm
		grossier	2,0 à 4,75mm
Gravier	4,75 à 75mm	fin	4,75mm à 19mm
		grossier	19 à 75mm
Cailloux	75 à 300mm		
Blocs	> 300mm		

TERMINOLOGIE

"traces"	1 - 10%
"un peu"	10 - 20%
adjectif (silteux, sableux)	20 - 35%
"et"	35 - 50%

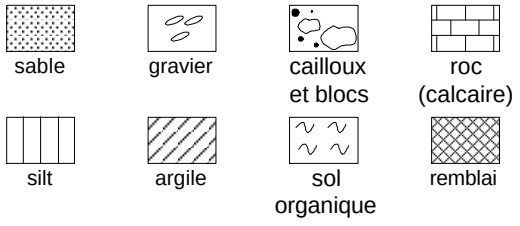
COMPACITÉ DES SOLS GRANULAIRES	INDICE DE PÉNÉTRATION STANDARD "N" (COUPS/PI. - 300mm)
Très lâche	0 - 4
Lâche	4 - 10
Compact	10 - 30
Dense	30 - 50
Très dense	> 50

CONSISTANCE DES SOLS COHÉRENTS	RÉSISTANCE AU CISAILLEMENT (Cu) (lb./pi.²)	(kPa)
Très molle	< 250	< 12
Molle	250 - 500	12 - 25
Ferme	500 - 1000	25 - 50
Raide	1000 - 2000	50 - 100
Très raide	2000 - 4000	100 - 200
Dure	> 4000	> 200

INDICE DE QUALITÉ DU ROC

VALEUR "RQD" (%)	QUALIFICATIF
< 25	très mauvais
25 - 50	mauvais
50 - 75	moyen
75 - 90	bon
> 90	excellent

SYMBOLES DE LA STRATIGRAPHIE



ÉCHANTILLONS:

TYPE ET NUMÉRO

Le type d'échantillonneur utilisé est défini par l'abréviation indiquée ci-après. La numérotation est continue pour chacun des types.

CF: Cuillère fendue
CFE, VRE, TAE: Échantillonnage environnemental
TM: Tube à paroi mince
PS: Tube à piston (Osterberg)
TA: Tarière
CR: Carottier diamanté
VR: Vrac

RÉCUPÉRATION

La récupération de l'échantillon est le rapport exprimé en pourcentage de la longueur récupérée dans l'échantillonneur à la longueur enfoncée.

RQD

Les indices de qualité du roc ("Rock Quality Designation" ou "RQD") sont définis comme étant le rapport exprimé en pourcentage de la longueur cumulée de tous les fragments de carottes de 4 pouces (10cm) ou plus à la longueur totale de la course.

ESSAIS DE CHANTIER:

N: Indice de pénétration standard
R: Refus à l'enfoncement
N_C: Indice de pénétration dynamique au cône
Cu: Résistance au cisaillement non drainé
Pr: Pressiomètre
k: Perméabilité
ABS: Absorption (eau sous pression)

ESSAIS DE LABORATOIRE:

I_P: Indice de plasticité
W_l: Limite liquide
W_P: Limite plastique
H: Sédimentométrie
AG: Analyse granulométrique
A: Limites d'Atterberg
w: Teneur en eau
g: Poids volumique
C: Consolidation
CS: Cône Suédois
CHIM: Analyse chimique
VO: Vapeur organique

INSPEC·SOL
INGÉNIERIE ET SOLUTIONS

RAPPORT DE FORAGE

FORAGE No: F-01

CLIENT: SERVICE CORRECTIONNEL DU CANADA
PROJET: ÉTUDE GÉOTECHNIQUE. PROJET 343-3023 - AMÉNAGEMENT PAVILLON "A", PHASE II
LOCALISATION: 246, MONTÉE GAGNON, STE-ANNE-DES-PLAINES, QUÉBEC
DÉCRIT PAR: M. DUBUC VÉRIFIÉ PAR: D. BEAUSEIGLE

COORDONNÉES GÉODÉSIQUES (MTM, NAD-83) (m)
X :
Y :
Z : 50.88

▼ - NIVEAU D'EAU
Date :
Profondeur (m) :

Plan de localisation : M029648-A1-1

Type de forage : Tarière
Calibre du carottier : NQ
Type de marteau : Automatique
Rapport d'énergie :
Date (début) : 2012-06-15
Date (fin) : 2012-06-15

TYPE ÉCHANTILLON
CF(E) - Cuillère fendue (Environnement)
CR(E) - Carottier diamanté
TA(E) - Tarière
TEE - Tube Échantillonnage Environnement
TM - Tube à paroi mince
VR(E) - Vrac

ÉTAT ÉCHANTILLON
Remanié
Intact
Forage au diamant
Perdu

ESSAIS RÉALISÉS
AG: analyse granulométrique
AC: analyse chimique
W_L: limite liquide
W_P: limite plastique
w : teneur en eau
C_u: cisaillement non drainé
S_T: sensibilité
Dup: éch. duplicata prélevé

COUPE STRATIGRAPHIQUE				ÉCHANTILLON						RÉSULTATS DES ESSAIS	
Profondeur (m)	Élévation (m)	Symbole	Stratigraphie	État	Type et Numéro	Récupération %	Autres Essais	PID (ppm)	Coups par 6 po / 15 cm (calibre)	N ou RQD	Niveau d'eau
0,0	50.88		Surface du sol							10 20 30 40 50 60 70 80 90	
			Remblai: Gazon en surface, silt sableux, traces de gravier, brun, humide, lâche		CF-1	33			1-2-1-2	3	
0.60	50.28		Silt, un peu de sable, brun à gris, très humide, lâche		CF-2 CFE-2	59			1-2-2-2	4	
1.20	49.68		Criblure de pierre (5-0mm) avec zones de silt argileux, grisâtre, très humide, compact à lâche		CF-3 CFE-3	44			3-6-4-3	10	
					CF-4 CFE-4	50			2-2-2-2	4	
2.40	48.48		**Sol naturel:** Argile silteuse, grise, ferme (croûte)		CF-5 CFE-5	54	w		1-2-2-2	4	
3.00	47.88		devenant saturée		TM-6	100	w A				
					CF-7 CFE-7	100			Poids du marteau	0	
					TM-8	100					
					CF-9	100			Poids du marteau	0	
					TM-10	100	w A				
					CF-11	100			Poids du marteau	0	
					TM-12	100					

Teneur en eau (%) △ C_u (Terrain, kPa)
Limites d'Atterberg (%) □ C_u (Lab, kPa)
Indice "N" standard
Indice "N_C" dynamique

FRANÇAIS - FORAGES METRES M029648A1-LOG1.GPJ INSPECSOL2009.GDT 8/13/12

INSPEC·SOL INGÉNIERIE ET SOLUTIONS

RAPPORT DE FORAGE

FORAGE No: F-01

CLIENT: SERVICE CORRECTIONNEL DU CANADA

PROJET: ÉTUDE GÉOTECHNIQUE. PROJET 343-3023 - AMÉNAGEMENT PAVILLON "A", PHASE II

LOCALISATION: 246, MONTÉE GAGNON, STE-ANNE-DES-PLAINES, QUÉBEC

DÉCRIT PAR: M. DUBUC VÉRIFIÉ PAR: D. BEAUSEIGLE

COORDONNÉES GÉODÉSIQUES (MTM, NAD-83) (m)
X :
Y :
Z : 50.88

▼ - NIVEAU D'EAU
Date :
Profondeur (m) :

Plan de localisation : M029648-A1-1

Type de forage : Tarière
Calibre du carottier : NQ
Type de marteau : Automatique
Rapport d'énergie :
Date (début) : 2012-06-15
Date (fin) : 2012-06-15

TYPE ÉCHANTILLON
CF(E) - Cuillère fendue (Environnement)
CR(E) - Carottier diamanté
TA(E) - Tarière
TEE - Tube Échantillonnage Environnement
TM - Tube à paroi mince
VR(E) - Vrac

ÉTAT ÉCHANTILLON
Remanié
Intact
Forage au diamant
Perdu

ESSAIS RÉALISÉS
AG: analyse granulométrique
AC: analyse chimique
W_L: limite liquide
W_P: limite plastique
w : teneur en eau
C_u: cisaillement non drainé
S_T: sensibilité
Dup: éch. duplicata prélevé

COUPE STRATIGRAPHIQUE				ÉCHANTILLON						RÉSULTATS DES ESSAIS		
Profondeur (m)	Élévation (m)	Symbole	Stratigraphie	État	Type et Numéro	Récupération %	Autres Essais	PID (ppm)	Coups par 6 po / 15 cm (calibre)	N ou RQD	○ Teneur en eau (%) ⊢ Limites d'Atterberg (W_P W_L) ● Indice "N" standard ▲ Indice "N_C" dynamique △ C_u (Terrain, kPa) □ C_u (Lab, kPa) 10 20 30 40 50 60 70 80 90	Niveau d'eau
0,0	50.88		Surface du sol									
9.89	40.99		Fin de l'échantillonnage Début de l'essai de pénétration dynamique (poids du marteau jusqu'à 19.2m)								2 2 8	

11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0

FRANÇAIS - FORAGES METRES M029648A1-LOG1.GPJ INSPECSOL2009.GDT 8/13/12

INSPEC·SOL
INGÉNIERIE ET SOLUTIONS

RAPPORT DE FORAGE

FORAGE No: F-01

CLIENT: SERVICE CORRECTIONNEL DU CANADA

PROJET: ÉTUDE GÉOTECHNIQUE. PROJET 343-3023 - AMÉNAGEMENT PAVILLON "A", PHASE II

LOCALISATION: 246, MONTÉE GAGNON, STE-ANNE-DES-PLAINES, QUÉBEC

DÉCRIT PAR: M. DUBUC VÉRIFIÉ PAR: D. BEAUSEIGLE

COORDONNÉES GÉODÉSIQUES (MTM, NAD-83) (m)
X :
Y :
Z : 50.88

▼ - NIVEAU D'EAU
Date :
Profondeur (m) :

Plan de localisation : M029648-A1-1

Type de forage : Tarière
Calibre du carottier : NQ
Type de marteau : Automatique
Rapport d'énergie :
Date (début) : 2012-06-15
Date (fin) : 2012-06-15

TYPE ÉCHANTILLON
CF(E) - Cuillère fendue (Environnement)
CR(E) - Carottier diamanté
TA(E) - Tarière
TEE - Tube Échantillonnage Environnement
TM - Tube à paroi mince
VR(E) - Vrac

ÉTAT ÉCHANTILLON
Remanié
Intact
Forage au diamant
Perdu

ESSAIS RÉALISÉS
AG: analyse granulométrique
AC: analyse chimique
W_L: limite liquide
W_P: limite plastique
w : teneur en eau
C_u: cisaillement non drainé
S_T: sensibilité
Dup: éch. duplicata prélevé

COUPE STRATIGRAPHIQUE				ÉCHANTILLON						RÉSULTATS DES ESSAIS	
Profondeur (m)	Élévation (m)	Symbole	Stratigraphie	État	Type et Numéro	Récupération %	Autres Essais	PID (ppm)	Coups par 6 po / 15 cm (calibre)	N ou RQD	○ Teneur en eau (%) △ C_u (Terrain, kPa) ⊢⊣ Limites d'Atterberg (%) □ C_u (Lab, kPa) ● Indice "N" standard ▲ Indice "N_C" dynamique 10 20 30 40 50 60 70 80 90
0,0	50.88		Surface du sol								Niveau d'eau
21.28	29.60		Fin de l'essai de pénétration dynamique Fin du forage								25 28 28

21.0
22.0
23.0
24.0
25.0
26.0
27.0
28.0
29.0

FRANÇAIS - FORAGES METRES M029648A1-LOG1.GPJ INSPECSOL2009.GDT 8/13/12

Annexe 3

- Résultats des essais de laboratoire

INSPEC•SOL

ANALYSE DES SOLS ET DES GRANULATS

CLIENT:	Service Correctionnel du Canada	**PLANCHE NO:**	1
		PROJET NO:	M029648 - A1
PROJET:	Étude géotechnique Projet 343-3023 - Aménagement Pavillon « A », phase II 246, Montée Gagnon, Ste-Anne-des-Plaines, Québec	**ÉCHANTILLON NO**	F01 TM6
		DATE:	12-06-27

Description du matériau: Argile de grande plasticité (CH).

Localisation du prélèvement: 3.00 - 3.60 m

Provenance:

Usage proposé:

Prélevé par:

Date de prélèvement:

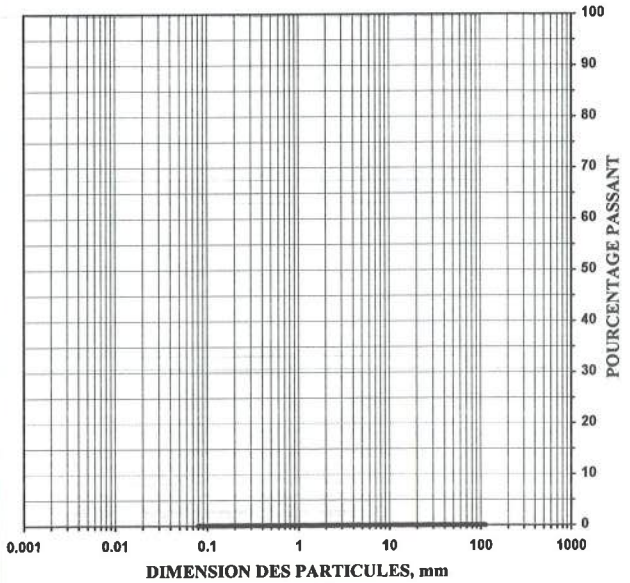
GRANULOMÉTRIE (% PASSANT) (LC 21-040)

Tamis		112 mm	80 mm	56 mm	40 mm	31.5 mm	28 mm	20 mm	14 mm	10 mm	5 mm	2.5 mm	1.25 mm	630 µm	315 µm	160 µm	80 µm
Résultats cumulatifs																	
Résultats individuels																	
Exigences	min.																
	max.																

AUTRES ESSAIS	Résultats	Exigences min.	Exigences max.
Teneur en eau (NQ 2501-170) (%)	60		
Limite de liquidité (NQ 2501-092)	89		
Limite de plasticité (NQ 2501-092)	27		
Indice de plasticité (NQ 2501-092)	62		

ESSAI PROCTOR (NQ 2501-255, méthode)	Résultats
Masse volumique sèche maximale	0 (kg/m^3)
Humidité optimale	0.0 (%)

COURBE GRANULOMÉTRIQUE



Remarques:

Préparé par: Benoit Cyr, géo

Vérifié par: David Beauseigle, ing. jr

INSPEC•SOL

ANALYSE DES SOLS ET DES GRANULATS

CLIENT:	Service Correctionnel du Canada	**PLANCHE NO:**	2
		PROJET NO:	M029648 - A1
PROJET:	Étude géotechnique Projet 343-3023 - Aménagement Pavillon « A », phase II 246, Montée Gagnon, Ste-Anne-des-Plaines, Québec	**ÉCHANTILLON NO**	F01 TM10
		DATE:	12-06-27

Description du matériau: Argile de grande plasticité (CH). **Localisation du prélèvement:** 6.09 - 6.65 m

Provenance:

Usage proposé: **Prélevé par:**

Date de prélèvement:

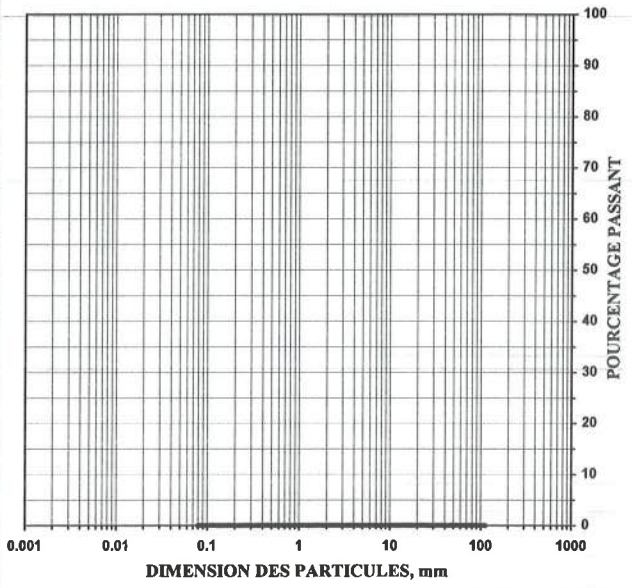
GRANULOMÉTRIE (% PASSANT) (LC 21-040)

Tamis		112 mm	80 mm	56 mm	40 mm	31.5 mm	28 mm	20 mm	14 mm	10 mm	5 mm	2.5 mm	1.25 mm	630 µm	315 µm	160 µm	80 µm
Résultats cumulatifs																	
Résultats individuels																	
Exigences	min.																
	max.																

AUTRES ESSAIS	Résultats	Exigences min.	Exigences max.
Teneur en eau (NQ 2501-170) (%)	68		
Limite de liquidité (NQ 2501-092)	61		
Limite de plasticité (NQ 2501-092)	22		
Indice de plasticité (NQ 2501-092)	39		

ESSAI PROCTOR (NQ 2501-255, méthode)	Résultats
Masse volumique sèche maximale	0 (kg/m^3)
Humidité optimale	0.0 (%)

COURBE GRANULOMÉTRIQUE



Remarques:

Préparé par: Benoit Cyr, géo

Vérifié par: David Beauseigle, ing. jr

INSPEC•SOL

ANALYSE DES SOLS ET DES GRANULATS

CLIENT:	Service Correctionnel du Canada	**PLANCHE NO:**	3
		PROJET NO:	M029648 - A1
PROJET:	Étude géotechnique Projet 343-3023 - Aménagement Pavillon « A », phase II 246, Montée Gagnon, Ste-Anne-des-Plaines, Québec	**ÉCHANTILLON NO**	F01 CF5
		DATE:	12-06-27

Description du matériau: _____ **Localisation du prélèvement:** 2.40 - 3.00 m

Provenance: _____

Usage proposé: _____ **Prélevé par:** _____

Date de prélèvement: _____

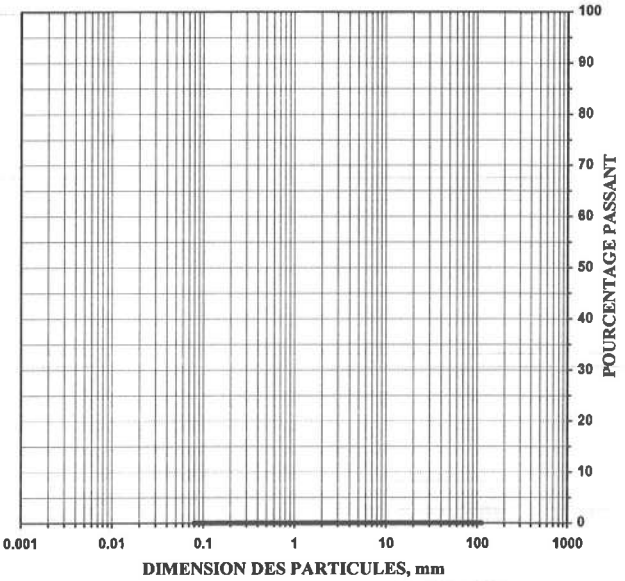
GRANULOMÉTRIE (% PASSANT) (LC 21-040)

Tamis		112 mm	80 mm	56 mm	40 mm	31.5 mm	28 mm	20 mm	14 mm	10 mm	5 mm	2.5 mm	1.25 mm	630 µm	315 µm	160 µm	80 µm
Résultats cumulatifs																	
Résultats individuels																	
Exigences	min.																
	max.																

AUTRES ESSAIS	Résultats	Exigences min.	Exigences max.
Teneur en eau (NQ 2501-170) (%)	50		

ESSAI PROCTOR (NQ 2501-255, méthode)	Résultats
Masse volumique sèche maximale	0 (kg/m³)
Humidité optimale	0.0 (%)

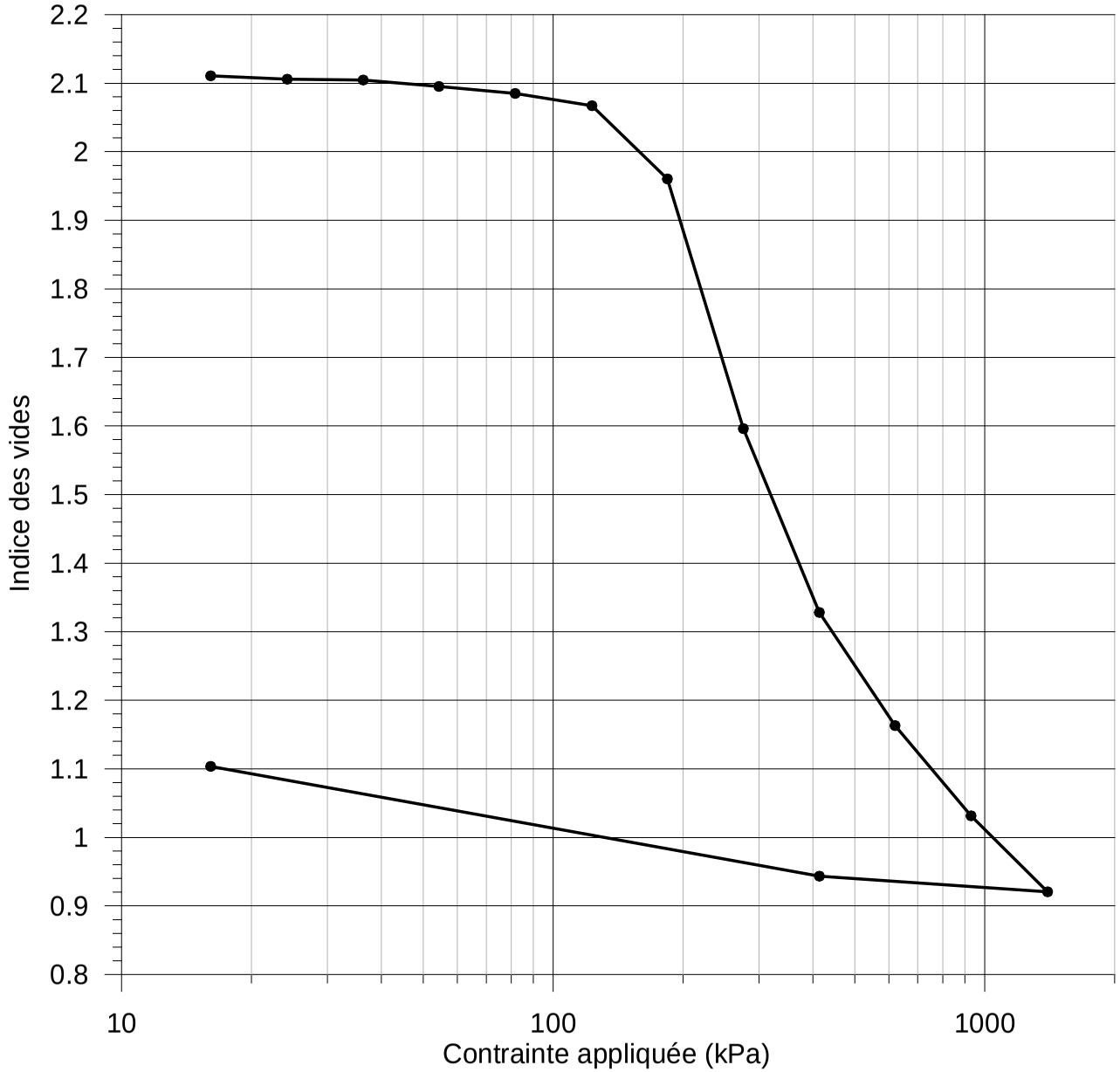
COURBE GRANULOMÉTRIQUE



Remarques: _____

Préparé par: Benoit Cyr, géo Vérifié par: David Beauseigle, ing. jr

Essai de Consolidation Oedométrique - F-1 TM-8



Échantillon Initial

Diamètre :	6.34 cm
Hauteur :	2.56 cm
Poids volumique :	15.19 kN/m^3
Teneur en eau :	71.54 %
Indice des vides :	2.12
Degré de saturation :	101 %
Densité des grains solides :	2.7 (assumée)

Échantillon Final

Teneur en eau : 43.02 %

Description du sol

Argile silteuse

Taux de chargement : 50%

Résultats d'essai

Indice de compression (c_c) : 2.068

Indice de recompression (c_r) : 0.114

Contrainte de préconsolidation (σ'_p) : 170 kPa

INSPEC-SOL	Forage : F-1 Échantillon : TM-8 Profondeur (m) : 4.87-5.02	Projet : Aménagement Pavillon A Site : Client : Service correctionnel du Canada Date : 4 juillet 2012	Projet (No): M029648-B1

Annexe 4

- Certificats d'analyses chimiques

INSPEC•SOL

GRILLE DE GESTION DES SOLS CONTAMINÉS EXCAVÉS INTÉRIMAIRE (26 JANVIER 1999) DU MINISTÈRE DU DÉVELOPPEMENT DURABLE DE L'ENVIRONNEMENT ET DES PARCS

NIVEAU DE CONTAMINATION	OPTIONS DE GESTION
< A	1. Utilisation sans restriction.
Plage A – B	1. Utilisation comme matériaux de remblayage sur les terrains contaminés à vocation résidentielle en voie de réhabilitation* ou sur tout terrain à vocation commerciale ou industrielle, à la condition que leur utilisation n'ait pas pour effet d'augmenter la contamination** du terrain récepteur et, de plus, pour un terrain à vocation résidentielle, que les sols n'émettent pas d'odeurs d'hydrocarbures perceptibles. 2. Utilisation comme matériaux de recouvrement journalier dans un lieu d'enfouissement sanitaire (LES). 3. Utilisation comme matériaux de recouvrement final dans un LES à la condition qu'ils soient recouverts de 15 cm de sol propre.
Plage B – C	1. Décontamination de façon optimale*** dans un lieu de traitement autorisé et gestion selon le résultat obtenu. 2. Utilisation comme matériaux de remblayage sur le terrain d'origine à la condition que leur utilisation n'ait pas pour effet d'augmenter la contamination** du terrain et que l'usage de ce terrain soit à vocation commerciale ou industrielle. 3. Utilisation comme matériaux de recouvrement journalier dans un LES.
> C	1. Décontamination de façon optimale*** dans un lieu de traitement autorisé et gestion selon le résultat obtenu. 2. Si l'option précédente est impraticable, dépôt définitif dans un lieu d'enfouissement sécuritaire autorisé pour recevoir des sols.

* Les terrains contaminés à vocation résidentielle en voie de réhabilitation sont ceux voués à un usage résidentiel dont une caractérisation a démontré une contamination supérieure au critère B et où l'apport de sols en provenance de l'extérieur sera requis lors des travaux de restauration.

** La contamination réfère à la nature des contaminants et à leur concentration.

*** Le traitement optimal est défini pour l'ensemble des contaminants par l'atteinte du critère B ou la réduction de 80% de la concentration initiale et pour les volatils par l'atteinte du critère B.

Principes de base

1. La qualité des sols propres doit être maintenue et protégée.
2. La décontamination des sols contaminés excavés est privilégiée.
3. La dilution est inacceptable.
4. L'objectif de décontamination est la réutilisation des sols.

Votre # du projet: M029648-A1
Adresse du site: SCC/ STE ANNE DU PLAINES
Votre # Bordereau: e849127

Attention: David Beauseigle
INSPEC-SOL INC
MONTRÉAL
4600 COTE VERTU
SUITE 200
VILLE ST-LAURENT, PQ
H4S 1C7

Date du rapport: 2012/07/18

CERTIFICAT D'ANALYSES

 # DE DOSSIER MAXXAM: B237099
Reçu: 2012/07/16, 13:00

Matrice: SOL
Nombre d'échantillons reçus: 2

Analyses	Quantité	Date de l' extraction	Date Analysé	Méthode de laboratoire	Référence primaire
Hydrocarbures pétroliers (C10-C50)	2	2012/07/17	2012/07/17	STL SOP-00172	MA. 416-C10-C50 1.0
Frais de gestion	2	N/A	2012/07/16		
Métaux par ICP	2	2012/07/17	2012/07/17	STL SOP-00006	MA.200- Mét 1.2
Hydrocarbures aromatiques polycycliques	2	2012/07/17	2012/07/17	STL SOP-00178	MA. 400 - HAP 1.1

clé de cryptage

Karima Dlimi

18 Jul 2012 11:27:35 -04:00

Veuillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

Karima Dlimi, B.Sc., chimiste, Assistante chargée de projets
Email: KDlimi@maxxam.ca
Phone# (514) 448-9001 Ext:4270

==========

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

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Dossier Maxxam: B237099
Date du rapport: 2012/07/18

INSPEC-SOL INC
Votre # du projet: M029648-A1
Adresse du site: SCC/ STE ANNE DU PLAINES

HAP PAR GCMS (SOL)

Identification Maxxam					R59363		R59364			
Date d'échantillonnage					2012/07/15		2012/07/15			
# Bordereau					e849127		e849127			
	Unités de	**A**	**B**	**C**	**F-01 CFE-2**	**CR**	**F-01 CFE-4**	**CR**	**LDR**	**Lot CQ**
% Humidité	%	-	-	-	20		7.3		N/A	N/A
HAP										
Acénaphtène	mg/kg	0.1	10	100	ND		ND		0.1	1029154
Acénaphtylène	mg/kg	0.1	10	100	ND		ND		0.1	1029154
Anthracène	mg/kg	0.1	10	100	ND		ND		0.1	1029154
Benzo(a)anthracène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Benzo(a)pyrène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Benzo(b+j+k)fluoranthène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Benzo(c)phénanthrène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Benzo(ghi)pérylène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Chrysène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Dibenz(a,h)anthracène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Dibenzo(a,i)pyrène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Dibenzo(a,h)pyrène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Dibenzo(a,l)pyrène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
7,12-Diméthylbenzanthracène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Fluoranthène	mg/kg	0.1	10	100	ND		ND		0.1	1029154
Fluorène	mg/kg	0.1	10	100	ND		ND		0.1	1029154
Indéno(1,2,3-cd)pyrène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
3-Méthylcholanthrène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Naphtalène	mg/kg	0.1	5	50	ND		ND		0.1	1029154
Phénanthrène	mg/kg	0.1	5	50	ND		ND		0.1	1029154
Pyrène	mg/kg	0.1	10	100	ND		ND		0.1	1029154
2-Méthylnaphtalène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
1-Méthylnaphtalène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
1,3-Diméthylnaphtalène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
2,3,5-Triméthylnaphtalène	mg/kg	0.1	1	10	ND		ND		0.1	1029154
Récupération des Surrogates (%)										
D10-Anthracène	%	-	-	-	94		96		N/A	1029154
D12-Benzo(a)pyrène	%	-	-	-	88		84		N/A	1029154
D14-Terphenyl	%	-	-	-	110		112		N/A	1029154
D8-Acenaphthylene	%	-	-	-	92		94		N/A	1029154
D8-Naphtalène	%	-	-	-	82		84		N/A	1029154

ND = inférieur à la limite de détection rapportée
N/A = Non Applicable
LDR = Limite de détection rapportée

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Dossier Maxxam: B237099
Date du rapport: 2012/07/18

INSPEC-SOL INC
Votre # du projet: M029648-A1
Adresse du site: SCC/ STE ANNE DU PLAINES

HYDROCARBURES PAR GCFID (SOL)

Identification Maxxam					R59363		R59364			
Date d'échantillonnage					2012/07/15		2012/07/15			
# Bordereau					e849127		e849127			
	Unités de	**A**	**B**	**C**	**F-01 CFE-2**	**CR**	**F-01 CFE-4**	**CR**	**LDR**	**Lot CQ**
% Humidité	%	-	-	-	20		7.3		N/A	N/A
HYDRO. PÉTROLIERS TOTAUX										
Hydrocarbures Pétroliers (C10-C50)	mg/kg	300	700	3500	ND		ND		100	1029145
Récupération des Surrogates (%)										
1-Chlorooctadécane	%	-	-	-	83		83		N/A	1029145

ND = inférieur à la limite de détection rapportée
N/A = Non Applicable
LDR = Limite de détection rapportée

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Dossier Maxxam: B237099
Date du rapport: 2012/07/18

INSPEC-SOL INC
Votre # du projet: M029648-A1
Adresse du site: SCC/ STE ANNE DU PLAINES

MÉTAUX (SOL)

Identification Maxxam					R59363		R59364			
Date d'échantillonnage					2012/07/15		2012/07/15			
# Bordereau					e849127		e849127			
	Unités de	**A**	**B**	**C**	**F-01 CFE-2**	**CR**	**F-01 CFE-4**	**CR**	**LDR**	**Lot CQ**
% Humidité	%	-	-	-	20		7.3		N/A	N/A
MÉTAUX										
Argent (Ag)	mg/kg	2	20	40	ND		ND		0.8	1029159
Arsenic (As)	mg/kg	6	30	50	ND		5	<A	5	1029159
Baryum (Ba)	mg/kg	200	500	2000	180	<A	33	<A	5	1029159
Cadmium (Cd)	mg/kg	1.5	5	20	ND		ND		0.5	1029159
Cobalt (Co)	mg/kg	15	50	300	19	A-B	7	<A	2	1029159
Chrome (Cr)	mg/kg	85	250	800	71	<A	9	<A	2	1029159
Cuivre (Cu)	mg/kg	40	100	500	36	<A	15	<A	2	1029159
Etain (Sn)	mg/kg	5	50	300	ND		ND		4	1029159
Manganèse (Mn)	mg/kg	770	1000	2200	540	<A	540	<A	2	1029159
Molybdène (Mo)	mg/kg	2	10	40	1	<A	7	A-B	1	1029159
Nickel (Ni)	mg/kg	50	100	500	43	<A	14	<A	1	1029159
Plomb (Pb)	mg/kg	50	500	1000	11	<A	11	<A	5	1029159
Zinc (Zn)	mg/kg	110	500	1500	93	<A	29	<A	10	1029159

ND = inférieur à la limite de détection rapportée
N/A = Non Applicable
LDR = Limite de détection rapportée

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Votre # du projet: M029648-A1
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REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON

Tous les résultats sont calculés sur une base sèche excepté lorsque non-applicable.

A,B,C,CR: Ces critères proviennent de l'Annexe 2 de la "Politique de protection des sols et de réhabilitation des terrains contaminés. Pour les analyses de métaux(et métalloides) dans les sols, le critère A désigne la " Teneur de fond Secteur Basses-Terres du Saint-Laurent ".
A,B-eau souterraine: A=Critère pour fin de consommation; B=Critère pour la résurgence dans les eaux de surface ou infiltration dans les égouts.
Ces références ne sont rapportées qu'à titre indicatif et ne doivent être interprétées dans aucun autre contexte.

- = Ce composé ne fait pas parti de la réglementation.

HAP PAR GCMS (SOL)

Veuillez noter que les résultats n'ont été corrigés ni pour la récupération des échantillons de contrôle qualité (blanc fortifié et blanc de méthode), ni pour les surrogates.

HYDROCARBURES PAR GCFID (SOL)

Veuillez noter que les résultats n'ont pas été corrigés pour la récupération des échantillons de contrôle de qualité (blanc fortifié et surrogates).
Veuillez noter que les résultats ont été corrigés pour le blanc de méthode.

MÉTAUX (SOL)

Veuillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux objets soumis à l'essai.

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INSPEC-SOL INC
Attention: David Beauseigle
Votre # du projet: M029648-A1
P.O. #:
Adresse du site: SCC/ STE ANNE DU PLAINES

Rapport Assurance Qualité

Dossier Maxxam: B237099

Lot Num	Lot Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	Unités de	Limites CQ
1029145	CT2	Blanc fortifié	1-Chlorooctadécane	2012/07/17		81	%	60 - 120
		Blanc fortifié DUP	1-Chlorooctadécane	2012/07/17		78	%	60 - 120
		Blanc fortifié	Hydrocarbures Pétroliers (C10-C50)	2012/07/17		78	%	70 - 130
		Blanc fortifié DUP	Hydrocarbures Pétroliers (C10-C50)	2012/07/17		76	%	70 - 130
		Blanc de méthode	1-Chlorooctadécane	2012/07/17		82	%	60 - 120
			Hydrocarbures Pétroliers (C10-C50)	2012/07/17	ND, LDR=100		mg/kg	
1029154	TN	Blanc fortifié	D10-Anthracène	2012/07/17		98	%	50 - 130
		Blanc fortifié DUP	D10-Anthracène	2012/07/17		96	%	50 - 130
		Blanc fortifié	D12-Benzo(a)pyrène	2012/07/17		92	%	50 - 130
		Blanc fortifié DUP	D12-Benzo(a)pyrène	2012/07/17		90	%	50 - 130
		Blanc fortifié	D14-Terphenyl	2012/07/17		116	%	50 - 130
		Blanc fortifié DUP	D14-Terphenyl	2012/07/17		112	%	50 - 130
		Blanc fortifié	D8-Acenaphthylene	2012/07/17		96	%	50 - 130
		Blanc fortifié DUP	D8-Acenaphthylene	2012/07/17		94	%	50 - 130
		Blanc fortifié	D8-Naphtalène	2012/07/17		88	%	50 - 130
		Blanc fortifié DUP	D8-Naphtalène	2012/07/17		86	%	50 - 130
		Blanc fortifié	Acénaphtène	2012/07/17		93	%	50 - 130
		Blanc fortifié DUP	Acénaphtène	2012/07/17		92	%	50 - 130
		Blanc fortifié	Acénaphtylène	2012/07/17		99	%	50 - 130
		Blanc fortifié DUP	Acénaphtylène	2012/07/17		96	%	50 - 130
		Blanc fortifié	Anthracène	2012/07/17		102	%	50 - 130
		Blanc fortifié DUP	Anthracène	2012/07/17		100	%	50 - 130
		Blanc fortifié	Benzo(a)anthracène	2012/07/17		107	%	50 - 130
		Blanc fortifié DUP	Benzo(a)anthracène	2012/07/17		102	%	50 - 130
		Blanc fortifié	Benzo(a)pyrène	2012/07/17		92	%	50 - 130
		Blanc fortifié DUP	Benzo(a)pyrène	2012/07/17		90	%	50 - 130
		Blanc fortifié	Benzo(b+j+k)fluoranthène	2012/07/17		94	%	50 - 130
		Blanc fortifié DUP	Benzo(b+j+k)fluoranthène	2012/07/17		94	%	50 - 130
		Blanc fortifié	Benzo(c)phénanthrène	2012/07/17		98	%	50 - 130
		Blanc fortifié DUP	Benzo(c)phénanthrène	2012/07/17		96	%	50 - 130
		Blanc fortifié	Benzo(ghi)pérylène	2012/07/17		83	%	50 - 130
		Blanc fortifié DUP	Benzo(ghi)pérylène	2012/07/17		80	%	50 - 130
		Blanc fortifié	Chrysène	2012/07/17		102	%	50 - 130
		Blanc fortifié DUP	Chrysène	2012/07/17		98	%	50 - 130
		Blanc fortifié	Dibenz(a,h)anthracène	2012/07/17		88	%	50 - 130
		Blanc fortifié DUP	Dibenz(a,h)anthracène	2012/07/17		81	%	50 - 130
		Blanc fortifié	Dibenzo(a,i)pyrène	2012/07/17		72	%	50 - 130
		Blanc fortifié DUP	Dibenzo(a,i)pyrène	2012/07/17		65	%	50 - 130
		Blanc fortifié	Dibenzo(a,h)pyrène	2012/07/17		55	%	50 - 130
		Blanc fortifié DUP	Dibenzo(a,h)pyrène	2012/07/17		50	%	50 - 130
		Blanc fortifié	Dibenzo(a,l)pyrène	2012/07/17		75	%	50 - 130
		Blanc fortifié DUP	Dibenzo(a,l)pyrène	2012/07/17		71	%	50 - 130
		Blanc fortifié	7,12-Diméthylbenzanthracène	2012/07/17		94	%	50 - 130
		Blanc fortifié DUP	7,12-Diméthylbenzanthracène	2012/07/17		93	%	50 - 130
		Blanc fortifié	Fluoranthène	2012/07/17		95	%	50 - 130
		Blanc fortifié DUP	Fluoranthène	2012/07/17		95	%	50 - 130
		Blanc fortifié	Fluorène	2012/07/17		113	%	50 - 130
		Blanc fortifié DUP	Fluorène	2012/07/17		112	%	50 - 130
		Blanc fortifié	Indéno(1,2,3-cd)pyrène	2012/07/17		86	%	50 - 130
		Blanc fortifié DUP	Indéno(1,2,3-cd)pyrène	2012/07/17		83	%	50 - 130
		Blanc fortifié	3-Méthylcholanthrène	2012/07/17		105	%	50 - 130
		Blanc fortifié DUP	3-Méthylcholanthrène	2012/07/17		102	%	50 - 130
		Blanc fortifié	Naphtalène	2012/07/17		91	%	50 - 130
		Blanc fortifié DUP	Naphtalène	2012/07/17		88	%	50 - 130
		Blanc fortifié	Phénanthrène	2012/07/17		96	%	50 - 130

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INSPEC-SOL INC
Attention: David Beauseigle
Votre # du projet: M029648-A1
P.O. #:
Adresse du site: SCC/ STE ANNE DU PLAINES

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B237099

Lot Num	Lot Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	Unités de	Limites CQ
1029154	TN	Blanc fortifié DUP	Phénanthrène	2012/07/17		94	%	50 - 130
		Blanc fortifié	Pyrène	2012/07/17		98	%	50 - 130
		Blanc fortifié DUP	Pyrène	2012/07/17		97	%	50 - 130
		Blanc fortifié	2-Méthylnaphtalène	2012/07/17		81	%	50 - 130
		Blanc fortifié DUP	2-Méthylnaphtalène	2012/07/17		80	%	50 - 130
		Blanc fortifié	1-Méthylnaphtalène	2012/07/17		79	%	50 - 130
		Blanc fortifié DUP	1-Méthylnaphtalène	2012/07/17		78	%	50 - 130
		Blanc fortifié	1,3-Diméthylnaphtalène	2012/07/17		108	%	50 - 130
		Blanc fortifié DUP	1,3-Diméthylnaphtalène	2012/07/17		106	%	50 - 130
		Blanc fortifié	2,3,5-Triméthylnaphtalène	2012/07/17		95	%	50 - 130
		Blanc fortifié DUP	2,3,5-Triméthylnaphtalène	2012/07/17		94	%	50 - 130
		Blanc de méthode	D10-Anthracène	2012/07/17		98	%	50 - 130
			D12-Benzo(a)pyrène	2012/07/17		90	%	50 - 130
			D14-Terphenyl	2012/07/17		112	%	50 - 130
			D8-Acenaphthylene	2012/07/17		96	%	50 - 130
			D8-Naphtalène	2012/07/17		84	%	50 - 130
			Acénaphtène	2012/07/17	ND, LDR=0.1		mg/kg	
			Acénaphtylène	2012/07/17	ND, LDR=0.1		mg/kg	
			Anthracène	2012/07/17	ND, LDR=0.1		mg/kg	
			Benzo(a)anthracène	2012/07/17	ND, LDR=0.1		mg/kg	
			Benzo(a)pyrène	2012/07/17	ND, LDR=0.1		mg/kg	
			Benzo(b+j+k)fluoranthène	2012/07/17	ND, LDR=0.1		mg/kg	
			Benzo(c)phénanthrène	2012/07/17	ND, LDR=0.1		mg/kg	
			Benzo(ghi)pérylène	2012/07/17	ND, LDR=0.1		mg/kg	
			Chrysène	2012/07/17	ND, LDR=0.1		mg/kg	
			Dibenz(a,h)anthracène	2012/07/17	ND, LDR=0.1		mg/kg	
			Dibenzo(a,i)pyrène	2012/07/17	ND, LDR=0.1		mg/kg	
			Dibenzo(a,h)pyrène	2012/07/17	ND, LDR=0.1		mg/kg	
			Dibenzo(a,l)pyrène	2012/07/17	ND, LDR=0.1		mg/kg	
			7,12-Diméthylbenzanthracène	2012/07/17	ND, LDR=0.1		mg/kg	
			Fluoranthène	2012/07/17	ND, LDR=0.1		mg/kg	
			Fluorène	2012/07/17	ND, LDR=0.1		mg/kg	
			Indéno(1,2,3-cd)pyrène	2012/07/17	ND, LDR=0.1		mg/kg	
			3-Méthylcholanthrène	2012/07/17	ND, LDR=0.1		mg/kg	
			Naphtalène	2012/07/17	ND, LDR=0.1		mg/kg	
			Phénanthrène	2012/07/17	ND, LDR=0.1		mg/kg	
			Pyrène	2012/07/17	ND, LDR=0.1		mg/kg	
			2-Méthylnaphtalène	2012/07/17	ND, LDR=0.1		mg/kg	
			1-Méthylnaphtalène	2012/07/17	ND, LDR=0.1		mg/kg	
			1,3-Diméthylnaphtalène	2012/07/17	ND, LDR=0.1		mg/kg	
			2,3,5-Triméthylnaphtalène	2012/07/17	ND, LDR=0.1		mg/kg	
1029159	SC5	Blanc fortifié	Argent (Ag)	2012/07/17		104	%	75 - 125
			Arsenic (As)	2012/07/17		100	%	75 - 125
			Baryum (Ba)	2012/07/17		106	%	75 - 125
			Cadmium (Cd)	2012/07/17		103	%	75 - 125
			Cobalt (Co)	2012/07/17		98	%	75 - 125
			Chrome (Cr)	2012/07/17		95	%	75 - 125
			Cuivre (Cu)	2012/07/17		103	%	75 - 125
			Etain (Sn)	2012/07/17		102	%	75 - 125
			Manganèse (Mn)	2012/07/17		90	%	75 - 125
			Molybdène (Mo)	2012/07/17		103	%	75 - 125
			Nickel (Ni)	2012/07/17		101	%	75 - 125
			Plomb (Pb)	2012/07/17		99	%	75 - 125
			Zinc (Zn)	2012/07/17		100	%	75 - 125
		Blanc de méthode	Argent (Ag)	2012/07/17	ND, LDR=0.8		mg/kg	

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INSPEC-SOL INC
Attention: David Beauseigle
Votre # du projet: M029648-A1
P.O. #:
Adresse du site: SCC/ STE ANNE DU PLAINES

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B237099

Lot Num	Lot Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	Unités de	Limites CQ
1029159	SC5	Blanc de méthode	Arsenic (As)	2012/07/17	ND, LDR=5		mg/kg	
			Baryum (Ba)	2012/07/17	ND, LDR=5		mg/kg	
			Cadmium (Cd)	2012/07/17	ND, LDR=0.5		mg/kg	
			Cobalt (Co)	2012/07/17	ND, LDR=2		mg/kg	
			Chrome (Cr)	2012/07/17	ND, LDR=2		mg/kg	
			Cuivre (Cu)	2012/07/17	ND, LDR=2		mg/kg	
			Etain (Sn)	2012/07/17	ND, LDR=4		mg/kg	
			Manganèse (Mn)	2012/07/17	ND, LDR=2		mg/kg	
			Molybdène (Mo)	2012/07/17	ND, LDR=1		mg/kg	
			Nickel (Ni)	2012/07/17	ND, LDR=1		mg/kg	
			Plomb (Pb)	2012/07/17	ND, LDR=5		mg/kg	
			Zinc (Zn)	2012/07/17	ND, LDR=10		mg/kg	

Blanc fortifié: Blanc auquel a été ajouté une quantité connue d'un ou de plusieurs composés chimiques d'intérêts. Sert à évaluer la récupération des composés d'intérêts.
Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.
Surrogate: Composé se comportant de façon similaire aux composés analysés et ajouté à l'échantillon avant l'analyse. Sert à évaluer la qualité de l'extraction.
LDR = Limite de détection rapportée

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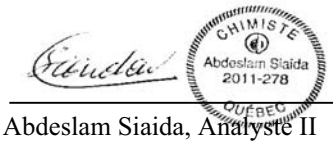
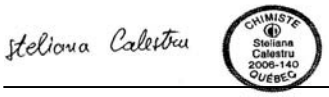
Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:



Abdeslam Siaida, Analyste II

Daniela Mazilu, B.Sc. Chimiste



Steliana Calestru, B.Sc. Chimiste

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