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| Parking Expansion       |               | October 2017     |
| R.079099.001            |               | May 2018 Revised |

Project Title Collins Bay Institution  
1455 Bath Road, Kingston Ontario  
Site Development and Parking Expansion

Project Number R.079099.001

Project Date October 2017 - May 2018 (Revised)

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APPENDIX

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|------------|--|
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| Appendix B | Geotechnical Investigation Report, Collins Bay Institution, Proposed New Parking Lots, Kingston, ON                                |

PART 1 - GENERAL

1.1 WORK COVERED BY  
CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general construction of a new parking area and modifications to the existing site, located at; Collins Bay Institution, Kingston, Ontario.
- .2 All contract work is to be completed as follows:
  - .1 Complete removals and site preparation, as well as installation of luminaires, ditches/swales, and all underground work. Placement of sub-base and granular's to design grades.
  - .2 Paving to design grades, pavement markings and topsoil/sod reinstatement.

1.2 CONTRACT METHOD

- .1 Construct Work under Combined Price Contract as per quantities and unit rates in Appendix 1.

1.3 CONTRACTOR USE  
OF PREMISE

- .1 Co-ordinate use of premises under direction of Departmental Representative.
- .2 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .3 At completion of operations condition of existing work: equal to or better than that which existed before new work started.
- .4 Existing parking to remain for owner's use. Contractor may not use or restrict existing parking area unless approved by Departmental Representative.

1.4 OWNER OCCUPANCY

- .1 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.5 EXISTING  
SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.



1.5 EXISTING  
SERVICES  
(Cont'd)

- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian vehicular traffic and owner operations.
- .3 Provide alternative routes for personnel pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide adequate bridging over trenches which cross walkways or roadways to permit normal traffic.
- .7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .9 Record locations of maintained, re-routed and abandoned service lines.
- .10 Construct barriers in accordance with Section 01 56 00.

1.6 DOCUMENTS  
REQUIRED

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.

- |                 |     |   |
|-----------------|-----|---|
| 1.6 DOCUMENTS   | .1  | (Cont'd)                                |
| REQUIRED        | .6  | Change Orders.                          |
| <u>(Cont'd)</u> | .7  | Other Modifications to Contract.        |
|                 | .8  | Field Test Reports.                     |
|                 | .9  | Copy of Approved Work Schedule.         |
|                 | .10 | Health and Safety Plan and Other Safety |
|                 |     | Related Documents.                      |
|                 | .11 | Other documents as specified.           |

PART 2 - PRODUCTS

- |                     |    |           |
|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- |                     |    |           |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not used. |
|---------------------|----|-----------|

PART 1 - GENERAL

1.1 ACCESS AND  
EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND  
FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Phase work so that work areas are delineated with barriers and maintain existing access and use of owner's parking. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 If any parking stalls are restricted by construction activities temporary parking stalls must be provided.
- .3 Maintain existing services to buildings and provide for personnel and vehicle access.
- .4 Contractor to submit a phasing plan for approval.
- .5 Where security is reduced by work provide temporary means to maintain security.
- .6 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING  
SERVICES

- .1 Notify, Departmental Representative utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel pedestrian and vehicular traffic.

1.3 EXISTING  
SERVICES  
(Cont'd)

- .4 Construct barriers in accordance with Section 01 56 00.

1.4 SPECIAL  
REQUIREMENTS

- .1 Carry out noise generating Work Monday to Friday in accordance with the City of Kingston by-laws.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.

1.5 SECURITY

- .1 Personnel employed on this project may be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
- .1 Personnel may be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.6 BUILDING  
SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not permitted.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION  
MEETING

- .1 Within 15 days after award of Contract, request meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:

1.2 PRECONSTRUCTION .5  
MEETING  
(Cont'd)

- (Cont'd)
- .1 Appointment of official representative of participants in the Work.
  - .2 Schedule of Work:
  - .3 Schedule of submission of shop drawings, samples. Submit submittals in accordance with Section 01 33 00
  - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00
  - .5 Site security in accordance with Section 01 56 00
  - .6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
  - .7 Record drawings in accordance with Section 01 33 00
  - .8 Monthly progress claims, administrative procedures, photographs, hold backs.
  - .9 Appointment of inspection and testing agencies or firms.
  - .10 Insurances, transcript of policies.

1.3 PROGRESS  
MEETINGS

- .1 During course of Work and prior to project completion, schedule progress meetings at two week intervals.
- .2 Contractor involved in Work and Departmental Representative and Owner are to be in attendance.
- .3 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 5 days after meeting.
- .4 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Review of off-site fabrication delivery schedules.
  - .6 Corrective measures and procedures to regain projected schedule.
  - .7 Revision to construction schedule.
  - .8 Progress schedule, during succeeding work period.

1.3 PROGRESS  
MEETINGS

(Cont'd)

.4 (Cont'd)

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.

.12 Other business.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative 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 Departmental Representative. 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 Departmental Representative, 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 Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative 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 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.
- .3 Allow 10 working days for Departmental Representative's review of each submission.
- .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter, in duplicate, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .7 Submissions shall include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

1.2 SHOP DRAWINGS  
AND PRODUCT DATA  
(Cont'd)

- .7 (Cont'd)
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Setting or erection details.
    - .4 Capacities.
    - .5 Performance characteristics.
    - .6 Standards.
    - .7 Operating weight.
    - .8 Wiring diagrams.
    - .9 Single line and schematic diagrams.
    - .10 Relationship to adjacent work.
  - .8 After Departmental Representative's review, distribute copies.
  - .9 Submit two hard copies and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
  - .10 Submit two hard copies and one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
  - .11 Submit two hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .12 Submit two hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
  - .13 Delete information not applicable to project.
  - .14 Supplement standard information to provide details applicable to project.

1.2 SHOP DRAWINGS  
AND PRODUCT DATA  
(Cont'd)

- .15 If upon review by Departmental Representative, 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.
- .16 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
- .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

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 Departmental Representative's business address in Kingston.
- .3 Notify Departmental Representative 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 Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

1.3 SAMPLES  
(Cont'd)

- .6 Make changes in samples which Departmental Representative 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 PHOTOGRAPHIC  
DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 2 locations.
  - .1 Viewpoints and their location as determined by Departmental Representative.
- .4 Frequency of photographic documentation: as directed by Departmental Representative.
  - .1 Upon completion of: Work, and as directed by Departmental Representative.

1.5 CERTIFICATES  
AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Safty and Insurance Board Experience Report.
- .2 Submit transcription of insurance immediately after award of Contract.

- 
- 1 PURPOSE .1 To ensure that both the construction project and the security operations may proceed without undue disruption or hindrance and that security is maintained at all times.
- 2 DEFINITIONS .1 "Contraband" means:
- .1 An intoxicant, including alcoholic beverages, drugs and narcotics.
  - .2 Tobacco or associated tobacco products.
  - .3 An igniting device, lighter or matches.
  - .4 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.
  - .5 An explosive or a bomb or a component thereof.
  - .6 Currency over any applicable prescribed limit, \$50 when possessed by an inmate without prior authorization.
  - .7 Any item not described in paragraphs 2.1.1 to 2.1.6 that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.
- .2 "Unauthorized Smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing 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, Warden or Superintendent of the Institution as applicable.
- .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 project manager from Public Works and Government Services Canada.
-

- 2 DEFINITIONS  
(Cont'd)
- .8 "Perimeter" means the fenced or walled area of the Institution that restrains the movement of the inmates.
- .9 "Construction Limits" means the area as shown on the contract drawings that the Contractor will be allowed to work". This area may or may not be isolated from the security area of the Institution.
- 3 PRELIMINARY PROCEEDINGS
- .1 Prior to the commencement of work, the Contractor shall meet with the Director or his/her representative to:
- .1 Discuss the nature and extent of all activities involved in the Project.
- .2 Establish mutually acceptable security procedures in accordance with this instruction and particular requirements.
- .2 Contractor shall:
- .1 Ensure that all Construction Employees are aware of the security requirements.
- .2 Ensure that a copy of the security requirements is always prominently on display at the job site.
- .3 Co-operate with CSC personnel in ensuring that security requirements are observed by all Construction Employees.
- 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 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.
-

4 CONSTRUCTION  
EMPLOYEES  
(Cont'd)

- .3 The Director may require that facial photographs may be taken of Construction Employees and these photographs may be displayed at appropriate locations or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all Construction Employees. ID cards will then be left at the designated entrance to be picked upon arrival and shall be displayed prominently on the Construction Employees' clothing at all time while Construction Employees are on the property.
- .4 Entry to CSC 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 the Property if they:
  - .1 Appear to be under the influence of alcohol, drugs or narcotics.
  - .2 Behave in an unusual or disorderly manner.
  - .3 Are in possession of contraband.
- .6 Smoking is prohibited anywhere on CSC property.

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. Lockable gas caps on all vehicles and motorized equipment may be required.
- .2 The Director may limit at any time the number and type of vehicles allowed on the property.
- .3 Drivers of delivery vehicles for material required by the project will not require security clearances but must remain with their vehicle the entire time that the vehicle is on the property. The Director may require that these vehicles be escorted by Staff or Commissionaires while in the Institution.

6 PARKING .1 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.

7 SHIPMENTS .1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the CSC's own shipments. The Contractor must have his/her 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.

8 TELEPHONES .1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the property 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.

9 WORK HOURS .1 Work hours are: Monday to Friday 07:00 a.m. to 5:00 p.m.

.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 waived by the Director.

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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 as 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 the Crown for such events may be attributed to the Contractor.
- .2 When overtime work, weekend, or statutory holiday work is required and approved by the Director, extra staff members may be posted by the Director or his/her designate, to maintain the security surveillance. The Departmental Representative may post extra staff for inspection of construction activities. The actual cost of this extra staff may be subject to reclamation by the Crown.

11 TOOLS AND EQUIPMENT

- .1 Maintain 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 up-to-date the 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. Scaffolding shall be secured and locked when not erected and when erected, will be secured in a manner agreed upon with the Institutional designate.
  - .6 All missing or lost tools or equipment shall be reported immediately to the Director.
-

11 TOOLS AND  
EQUIPMENT  
(Cont'd)

- .7 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:
  - .1 At the beginning and conclusion of every construction project.
  - .2 Weekly, when the construction project extends longer than a one week period.
  - .3 The Contractor may be subject to random checks by security staff to ensure proper storage and security of tools throughout the project.
- .8 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.
- .9 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.
- .10 If torches or grinders are required tools to perform Work, Contractor must complete a Hot Work Permit as supplied by CSC. Completed original form(s) are copied and posted on the work site in a conspicuous location. Original documents are to remain with the Institutional Fire Chief.

12 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 property.
- .3 Smoking is only permitted outside the perimeter of a correctional facility in an area to be designated by the Director.

13 CONTRABAND

- .1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on CSC Property.
- .2 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 shall 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 CSC property 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.

14 SEARCHES

- .1 All vehicles and persons entering CSC 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/she may order that person to be searched.
- .3 All employees entering the CSC property may be subject to screening of personal effects for traces of Contraband drug residue.

15 ACCESS TO AND  
REMOVAL FROM  
INSTITUTION  
PROPERTY

- .1 Construction personnel and commercial vehicles will not be admitted on the property after normal working hours, unless approved by the Director.

16 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:
    - .1 07:45 a.m. 07:45 hrs. to 11:00 a.m. 11:00 hrs.
    - .2 1:00 p.m. 13:00 hrs. to 3:30 p.m. 15:30 hrs.
-

16 MOVEMENT OF  
VEHICLES  
(Cont'd)

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- .2 Construction vehicles shall not leave the Institution until an inmate count is completed.
- .3 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.
- .4 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.
- .5 Commercial Vehicles will only be allowed access to Institutional Property when their contents are certified by the Contractor or his/her representative as being strictly necessary to the execution of the construction project.
- .6 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.
- .7 Private vehicles of Construction Employees will not be allowed within the security wall or fence of medium or maximum security Institutions without the permission of the Director.
- .8 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.
- .9 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 solid object.

17 MOVEMENT OF  
CONSTRUCTION  
EMPLOYEES ON  
INSTITUTIONAL  
PROPERTY

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- .1 Subject to the requirements of good security, the Director will permit the Contractor and his/her employees as much freedom of action and movement as is possible.

17 MOVEMENT OF  
CONSTRUCTION  
EMPLOYEES ON  
INSTITUTIONAL  
PROPERTY  
(Cont'd)

- .2 However, notwithstanding paragraph above, the Director may:
- .1 Prohibit or restrict access to any part of the property.
- .2 Require that in certain areas of the property, either during the entire construction project or at certain intervals, Construction Employees only be allowed access when accompanied by a member of the CSC security staff.
- .3 During the lunch and coffee/health breaks, all employees will remain within the construction site. Employees are not permitted to eat in the officer's lounge and dining room.

18 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.

19 STOPPAGE OF  
WORK

- .1 The Director may request at any time that the Contractor, his/her employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation. The Contractor's site supervisor shall note the name of the staff member making the request and the time of the request and obey the order as quickly as possible.
- .2 The Contractor shall advise the Departmental Representative within 24 hours of this delay to the progress of the work.

20 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 employee doing any of the above will be removed from the site and his/her security clearance revoked.
-

- |   |    |  |
|---|----|--|
| 20 CONTACT WITH<br>INMATES<br>(Cont'd)      | .2 | It is forbidden to take pictures of inmates, of CSC staff members or of any part of the property other than those required as part of this Contract.   |
| 21 COMPLETION OF<br>CONSTRUCTION<br>PROJECT | .1 | 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 on the property as part of the construction contract. |

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Ontario:
  - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.

1.2 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operations found in work plan.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .5 Submit one copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and authority having jurisdiction.

1.2 SUBMITTALS  
(Cont'd)

- .6 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
- .7 Submit copies of incident and accident reports.
- .8 Submit Material Safety Data Sheets (MSDS).
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

1.3 FILING OF  
NOTICE

- .1 File Notice of Project with Provincial authorities prior to commencement of Work.

1.4 SAFETY  
ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

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

1.6 REGULATORY  
REQUIREMENTS

- .1 Comply with the Acts and regulations of the Province of Ontario.
- .2 Comply with specified standards and regulations to ensure safe operations at site.

1.7 GENERAL  
REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.



1.8 COMPLIANCE  
REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.9 UNFORSEEN  
HAZARDS

- .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.
- .2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.10 POSTING OF  
DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
  - .1 Contractor's Safety Policy.
  - .2 Constructor's Name.
  - .3 Notice of Project.
  - .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
  - .5 Ministry of Labour Orders and reports.
  - .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
  - .7 Address and phone number of nearest Ministry of Labour office.
  - .8 Material Safety Data Sheets.
  - .9 Written Emergency Response Plan.
  - .10 Site Specific Safety Plan.
  - .11 Valid certificate of first aider on duty.
  - .12 WSIB "In Case of Injury At Work" poster.
  - .13 Location of toilet and cleanup facilities.

1.11 CORRECTION OF  
NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

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1.11 CORRECTION OF  
NON-COMPLIANCE  
(Cont'd)

- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.12 BLASTING

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.

1.13 POWDER  
ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.14 WORK STOPPAGE

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not used.

## PART 1 - GENERAL

- |   |    |   |
|---|----|---|
| <u>1.1 DEFINITIONS</u>                        | .1 | Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.  |
|   | .2 | Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants. |
| <u>1.2 SUBMITTALS</u>                         | .1 | Submittals: in accordance with Section 01 33 00 - Submittal Procedures.   |
|   | .2 | Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.  |
| <u>1.3 FIRES</u>                              | .1 | Fires and burning of rubbish is not permitted on site.  |
| <u>1.4 DISPOSAL OF WASTES</u>                 | .1 | Do not bury rubbish and waste materials on site.  |
|   | .2 | Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.  |
| <u>1.5 EROSION AND SEDIMENT CONTROL (ESC)</u> | .1 | Prevent the loss of soil during construction by receiving streams during construction.  |
|   | .2 | Prevent air pollution from dust and particulate matter during construction activities.  |

- 
- .3 The Contractor is to designate an individual to be responsible for all aspects of ESC work.
- 1.6 DRAINAGE AND DEWATERING SYSTEM
- .1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, into waterways, sewer, and drainage systems.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- 1.7 SITE CLEARING AND PLANT PROTECTION
- .1 Protect trees and plants on site and adjacent properties not identified for removal.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.
- 1.8 WORK ADJACENT TO WATERWAYS
- .1 Do not dump excavated fill, waste material or debris within 5 m of waterways.
- 1.9 POLLUTION CONTROL
- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.10 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 SILT FENCE FABRIC

- .1 Fabric to be woven and comply with OPSS 1860.07.05.03.

PART 3 - EXECUTION

3.1 EXAMINATION AND  
MITIGATION

- .1 Site verification of conditions and mitigation measures.
  - .1 Follow guidelines presented in Appendix A: Environmental Effects Evaluation Report March 2018.
  - .2 Confirm accessibility of site for equipment.

3.2 SITE-WIDE  
PRACTICES

- .1 Keep the main entrance road clear of any mud or earth tracked from vehicles.
- .2 Dust Control:
  - .1 Dust Control measures are to be as per OPSS 306.
  - .2 Dust suppressants other than water or calcium chloride (flake or solution) require prior approval.

3.3 INSTALLATION OF  
ESC MEASURES

- .1 Installation of the ESC measures is to be conducted in such a way that downstream measures (those measures closest to water course to be protected) are to be installed prior to upstream measures.
- .2 Temporary Stabilization Measures:
  - .1 Be aware that any contamination of stockpiled material or of graded surfaces by temporary

stabilization method is to be resolved at the Contractor's expense.

- .3 Sedimentation Prevention Measures:
  - .1 Catch Basin Lid Filter Cloth .1 All catch basins and catch basin manholes are to have a double layer of geotextile placed under their lids to prevent sedimentation of the storm sewer system.
  - .2 Ditch Inlet Protection:
    - .1 All ditch inlets are to be protected by a straw bale flow check immediately upstream of the ditch inlet, until all areas draining into the ditch inlet have been permanently stabilized.
    - .2 All ditch inlets are to have a double layer of geotextile placed under their lids to prevent sedimentation of the storm sewer system.
  - .3 All ditch inlets are to have a double layer of geotextile placed under their lids to prevent sedimentation of the storm sewer system.

### 3.4 INSPECTION OF ESC MEASURES

- .1 Once a week, or immediately after any rainfall event of at least 12 mm, each ESC measure onsite is to be inspected in its entirety. All ESC measures are to be maintained in good working order.
- .2 Inspection of Structural Measures:
  - .1 Silt Fence:
    - .1 Silt fence is to be inspected for: depth of embedment, tears or holes, erosion around or under the fence, sagging or collapse.
    - .2 Sediment accumulation reaching 1/3 fence height is to be removed and relocated to areas onsite of low erosion potential.
- .3 All seeded or planted areas are to be inspected to ensure vegetative growth. Where vegetation has washed away, or died off, additional seeding is to be applied. Ensure area has sufficient water to promote growth.

3.5 ESC MEASURE  
REMOVAL

- .1 After all of the upstream construction work has been completed, including the removal of upstream ESC measures, all areas have been permanently stabilized according to the Landscape Drawings, and if approved by the Departmental Representative, the ESC measure may be removed.
- .2 All accumulated sediment at the ESC measure is to be removed.

**END OF SECTION**

PART 1 - GENERAL

- |   |    |  |
|---|----|--|
| <u>1.1 REFERENCES AND<br/>CODES</u>         | .1 | Perform Work in accordance with National Building Code of Canada (NBC) 2010, National Fire Code of Canada (NFC) 2010 and Ontario Building Code (OBC) 2012, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply. |
|   | .2 | Meet or exceed requirements of:<br>.1 Contract documents.<br>.2 Specified standards, codes and referenced documents.   |
| <u>1.2 BUILDING<br/>SMOKING ENVIRONMENT</u> | .1 | Comply with smoking restrictions and municipal bylaws.   |

PART 2 - PRODUCTS

- |                     |    |           |
|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- |                     |    |           |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|



PART 1 - GENERAL

1.1 INSPECTION

- .1 Allow Departmental Representative 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.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 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.
- .4 Departmental Representative may order any 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, Departmental Representative shall pay cost of examination and replacement.

1.2 INDEPENDENT  
INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .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 Departmental Representative at no cost to Departmental Representative. 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 and Departmental Representative 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 an orderly sequence so as not to cause delay 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 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 Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.6 REPORTS

- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
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|--------------------------------|----|--|
| <u>1.6 REPORTS</u><br>(Cont'd) | .2 | Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested. |
|--------------------------------|----|--|

|  |    |  |
|--|----|--|
| <u>1.7 TESTS AND MIX</u><br><u>DESIGNS</u> | .1 | Furnish test results and mix designs as may be requested.  |
|  | .2 | The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable. |

|                       |    |  |
|-----------------------|----|--|
| <u>1.8 MILL TESTS</u> | .1 | Submit mill test certificates as required of specification Sections. |
|-----------------------|----|--|

PART 2 - PRODUCTS

|                     |    |           |
|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

|                     |    |           |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 1 - GENERAL

|                       |    |   |
|-----------------------|----|---|
| <u>1.1 SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00. |
|-----------------------|----|---|

|                       |    |  |
|-----------------------|----|--|
| <u>1.2 DEWATERING</u> | .1 | Provide temporary drainage and pumping facilities to keep excavations and site free from standing water. |
|-----------------------|----|--|

PART 2 - PRODUCTS

|                     |    |           |
|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
  - .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA 0121, Douglas Fir Plywood.
  - .3 CAN/CSA S269.2-M87(R2008), Access Scaffolding for Construction Purposes.
  - .4 CAN/CSA Z321-96(R2006), Signs and Symbols for the Occupational Environment.

1.2 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.

1.3 SITE  
STORAGE/LOADING

- .1 Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.4 CONSTRUCTION  
PARKING

- .1 Parking will be permitted on site within a designated area for designated number of vehicles by Departmental Representative.
- .2 Provide and maintain adequate access to project site.
- .3 Provide snow removal within designated parking area during period of Work.

1.5 SANITARY  
FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.6 CONSTRUCTION  
SIGNAGE

- .1 Locate project identification sign as directed by Departmental Representative and construct as follows:
  - .1 Build concrete foundation, erect framework, and attach signboard to framing.
  - .2 Paint all surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
  - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .2 Direct requests for approval to erect a Departmental Representative signboard to Departmental Representative. For consideration general appearance of Departmental Representative signboard must conform to project identification site sign. Wording shall be in both official languages.
- .3 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321.
- .4 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.

1.6 CONSTRUCTION  
SIGNAGE  
(Cont'd)

- .5 No other signs or sdvertisments, other than warning signs are permitted on site.

1.7 PROTECTION AND  
MAINTENANCE OF  
TRAFFIC

- .1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .2 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
- .3 Protect travelling public from damage to person and property.
- .4 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .6 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .7 Dust control: adequate to ensure safe operation at all times.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB):
  - .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
  - .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA):
  - .1 CSA 0121, Douglas Fir Plywood.

1.2 MEASUREMENT AND  
PAYMENT PROCEDURES

- .1 All temporary barriers and enclosures required for work to be included in balance of project.
- .2 Measure new precast concrete jersey barriers per unit installed.

1.3 INSTALLATION  
AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.4 HOARDING

- .1 Erect temporary site enclosure using 1.2m high, snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m o.c. Provide one lockable truck gate. Maintain fence in good repair.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.5 GUARD RAILS AND  
BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations.
- .2 Provide as required by governing authorities.

1.6 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.



|                                |    |   |
|--------------------------------|----|---|
| <u>1.7 PUBLIC TRAFFIC FLOW</u> | .1 | Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public. |
|--------------------------------|----|---|

|                        |    |   |
|------------------------|----|---|
| <u>1.8 FIRE ROUTES</u> | .1 | Maintain access to property including overhead clearances for use by emergency response vehicles. |
|------------------------|----|---|

|  |    |   |
|--|----|---|
| <u>1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY</u> | .1 | Protect surrounding private and public property from damage during performance of Work. |
|  | .2 | Be responsible for damage incurred.   |

## PART 2 - PRODUCTS

|                                     |    |   |
|-------------------------------------|----|---|
| <u>2.1 CONCRETE JERSEY BARRIERS</u> | .1 | Temporary Concrete Barrier: As per OPSS 740. Precast units and connections to match existing concrete barriers. |
|-------------------------------------|----|---|

## PART 3 - EXECUTION

|                                     |    |   |
|-------------------------------------|----|---|
| <u>3.1 CONCRETE JERSEY BARRIERS</u> | .1 | Place temporary concrete barriers to lines indicated on contract drawings. Coordinate final layout with Departmental Representative and reuse existing concrete jersey barriers as available. |
|-------------------------------------|----|---|

PART 1 - GENERAL

1.1 CONSTRUCTION &  
DEMOLITION WASTE

- .1 Carefully deconstruct and source separate materials/equipment and divert, from construction/demolition waste destined for landfill to maximum extent possible.
- .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
  - .1 Provide facilities for collection, handling and storage of source separated wastes.
  - .2 Source separate the following waste:
    - .1 Brick and portland cement concrete.
    - .2 Corrugated cardboard.
    - .3 Wood, not including painted or treated wood or laminated wood.
    - .4 Gypsum board, unpainted.
    - .5 Steel.
    - .6 Asphalt and granular materials.
- .3 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

PART 1 - GENERAL

|                                  |    |   |
|----------------------------------|----|---|
| <u>1.1 SECTION<br/>INCLUDES_</u> | .1 | Methods for removal of existing asphalt pavement. |
|----------------------------------|----|---|

|  |    |   |
|--|----|---|
| <u>1.2 WASTE<br/>MANAGEMENT AND<br/>DISPOSAL</u> | .1 | Separate waste materials for recycling in accordance with Section 01 74 20. |
|  | .2 | Divert unused asphalt materials from landfill to local facility.            |

PART 2 - PRODUCTS

|                      |    |  |
|----------------------|----|--|
| <u>2.1 EQUIPMENT</u> | .1 | Use cold milling, planning or grinding equipment with automatic grade controls capable of operating from stringline, and capable of removing part of pavement surface to depths or grades indicated. |
|----------------------|----|--|

PART 3 - EXECUTION

|                        |    |  |
|------------------------|----|--|
| <u>3.1 PREPARATION</u> | .1 | Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed. |
|------------------------|----|--|

|                       |    |   |
|-----------------------|----|---|
| <u>3.2 PROTECTION</u> | .1 | Protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost. |
|-----------------------|----|---|

|                    |    |  |
|--------------------|----|--|
| <u>3.3 REMOVAL</u> | .1 | Remove existing asphalt pavement to lines and grades as indicated. |
|--------------------|----|--|

- |                                  |    |  |
|----------------------------------|----|--|
| <u>3.3 REMOVAL<br/>(Cont'd)</u>  | .2 | Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.   |
|                                  | .3 | Sawcut along lines designated on contract drawings to provide a clean true edge on existing asphalt.   |
|                                  | .4 | Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.  |
|                                  | .5 | Provide for suppression of dust generated by removal process.  |
| <u>3.4 FINISH<br/>TOLERANCES</u> | .1 | Finished surfaces in areas where asphalt pavement has been removed to be within +/-5 mm of grade specified but not uniformly high or low.            |
| <u>3.5 SWEEPING</u>              | .1 | Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required. |

PART 1 - GENERAL

- |   |    |   |
|---|----|---|
| <u>1.1 RELATED SECTIONS</u>               | .1 | Section 31 23 33.01 - Excavating, Trenching and Backfilling.  |
|   | .2 | Section 02 41 13.14 Asphalt Paving Removal  |
| <u>1.2 MEASUREMENT PROCEDURES</u>         | .1 | All clearing & grubbing and tree removal is to be included in balance of project.   |
|   | .2 | Payment for disposal, excavating, backfilling and restoration will be included in above removal items.  |
| <u>1.3 SUBMITTALS</u>                     | .1 | Submittals in accordance with Section 01 33 00.   |
| <u>1.4 QUALITY ASSURANCE</u>              | .1 | Site Meetings.<br>.1 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work to determine extents of removal.   |
| <u>1.5 DELIVERY, STORAGE AND HANDLING</u> | .1 | Perform Work in accordance with Section 01 35 43.   |
|   | .2 | Waste Management and Disposal.<br>.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.  |
| <u>1.6 SITE CONDITIONS</u>                | .1 | Site Environmental Requirements.<br>.1 Perform work in accordance with Section 01 35 43.<br>.2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.<br>.3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. |
-

- 1.6 SITE CONDITIONS (Cont'd)
- .1 (Cont'd)
  - .3 (Cont'd)
    - .1 Ensure proper disposal procedures are maintained throughout the project.
    - .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
    - .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
    - .6 Protect trees, plants and foliage on site and adjacent properties where indicated.

PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- 3.2 REMOVAL OPERATIONS
- .1 Remove items as indicated.
  - .2 Do not disturb items designated to remain in place.
  - .3 Clear & grub vegetation and remove as many trees as required during demolition.
    - .1 Obtain approval of Departmental Representative prior to removal of trees.
  - .4 Disposal of Material.
    - .1 Dispose of materials not designated for salvage or reuse on site as instructed by Departmental Representative.
    - .2 Trim disposal areas to approval of Departmental Representative.
  - .5 Backfill.
    - .1 Backfill in areas as indicated and in accordance with Section 31 23 33.01.

3.2 REMOVAL  
OPERATIONS  
(Cont'd)

- .5 (Cont'd)
- .2 For removal of transite pipe, work is to comply with Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects And In Buildings And Repair Operations made under Occupational Health and Safety Act R.R.O. 1990 as amended and local requirements pertaining to asbestos, provided that in case of conflict with these specifications, the more stringent requirements shall apply.

3.3 STOCKPILING

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.4 REMOVAL FROM  
SITE

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .3 Transport material designated for alternate disposal using approved haulers listed in Waste Reduction Workplan and in accordance with applicable regulations.  
.1 Written authorization from Departmental Representative is required to deviate from haulers listed in Waste Reduction Workplan.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.  
.1 Disposal Facilities: approved and listed in Waste Reduction Workplan.

3.4 REMOVAL FROM  
SITE

(Cont'd)

- .4 (Cont'd)  
.2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.5 RESTORATION

- .1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.  
.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.6 CLEANING

- .1 Remove debris, trim surfaces and leave work site clean, upon completion of Work.  
.2 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.



PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1 Cast-in-Place Concrete: Section 03 30 00.01.

1.2 REFERENCES .1 American Concrete Institute (ACI)  
.1 SP-66-04, ACI Detailing Manual 2004.  
.1 ACI 315-99, Details and Detailing of Concrete Reinforcement.  
.2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.  
.2 ASTM International  
.1 ASTM A 775/A 775M - 07b, Standard Specification for Epoxy Coated Reinforcing Steel Bars.  
.3 CSA International  
.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.  
.2 CSA-A23.3-04, Design of Concrete Structures.  
.4 Reinforcing Steel Institute of Canada (RSIC)  
.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.  
.1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

1.5 MEASUREMENT AND PAYMENT PROCEDURES .1 Included in the balance of the project.

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PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: billet steel, grade 400, epoxy coated deformed bars to CSA-G30.18, unless indicated otherwise.
- .3 Cold-drawn annealed steel wire ties: to ASTM A 82/A 82M.
- .4 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .5 Epoxy Coating of non-prestressed reinforcement: to ASTM A 775/A 775M.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
  - .1 Ship epoxy coated bars in accordance with ASTM A 775A/A 775M.

PART 3 - EXECUTION

3.1 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.2 PLACING  
REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- .4 Protect epoxy and paint coated portions of bars with covering during transportation and handling.

3.3 FIELD TOUCH -UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1 Section 26 56 19 - Roadway Lighting.

1.2 REFERENCES .1 ASTM International  
.1 ASTM A 185/A 185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.  
.2 ASTM D 260-86(2001), Standard Specification for Boiled Linseed Oil.  
.3 ASTM D 1751-04, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).  
.2 Canadian General Standards Board (CGSB)  
.1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.  
.3 CSA International  
.1 CSA-A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.  
.2 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).  
.3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.

1.3 ADMINISTRATIVE REQUIREMENTS .1 Verify project requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.  
.2 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

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1.5 QUALITY  
ASSURANCE

- .1 Provide to Departmental Representative  
weeks minimum prior to starting concrete work,  
valid and recognized certificate from plant  
delivering concrete.
  - .1 Quality Control Plan: provide written report  
to Departmental Representative verifying  
compliance that concrete in place meets  
performance requirements.
  - .2 Sustainability Standards Certification:
    - .1 Construction Waste Management: provide  
copy of plan.
    - .2 Recycled Content:
      - .1 Provide listing of recycled content  
products used.
      - .2 When Supplementary Cementing  
Materials (SCMs) are used, provide  
evidence to certify reduction in cement  
from Base Mix to Actual SCMs Mix, as  
percentage.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Delivery and Acceptance Requirements:
  - .1 Concrete hauling time: deliver to site of  
Work and discharged within 120 minutes maximum  
after batching.
    - .1 Do not modify maximum time limit without  
receipt of prior written agreement from  
Departmental Representative DCC  
Representative Consultant and concrete  
producer as described in CSA A23.1/A23.2.
    - .2 Deviations to be submitted for review by  
the Departmental Representative DCC  
Representative Consultant.
- .2 Concrete delivery: ensure continuous concrete  
delivery from plant meets CSA A23.1/A23.2.

1.7 MEASUREMENT AND  
PAYMENT PROCEDURES

- .1 Included in balance of the project.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

- .1 Alternative 1 - Performance Alternative 2 -  
Prescription: to CSA A23.1/A23.2, and as described  
in MIXES of PART 2 - PRODUCTS.

## 2.2 MATERIALS

- .1 Cement: to CSA A3001, Type GU.
- .2 Blended hydraulic cement: Type GUb to CSA A3001.
- .3 Water: to CSA A23.1/A23.2.
- .4 Premoulded joint filler:
  - .1 Bituminous impregnated fibreboard: to ASTM D 1751.
- .5 Joint sealer/filler: grey to CAN/CGSB-19.24, Type 1, Class B.
- .6 Curing Compound; to CSA. A23.1/A23.2 white and ASTM C209, Type 1 chlorinated rubber or Type 1 D with fugative dye
- .7 Other concrete materials: to CSA A23.1/A23.2.

## 2.3 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
  - .2 Provide concrete mix to meet following plastic state requirements:
    - .1 Proportion normal density concrete in accordance with CAN/CSA A23.1-04 Table 5. Alternative. Provide a minimum of 25% Supplementary Cementing Materials.
    - .2 Cement Tables 6 and 7 CAN/CSA A23.1-04
    - .3 Minimum 28 day compressive strength - 35 MPa
    - .4 Class of Exposure - C-1
    - .5 Slump at Discharge - 60 to 80mm (curb machine 25-45mm)
    - .6 Air content - 4% to 7%
    - .7 Maximum aggregate size - 19mm

## PART 3 - EXECUTION

### 3.1 PREPARATION

- .1 Provide Departmental Representative 24 hours notice before each concrete pour.
- .2 During concreting operations:

|  |    |   |
|--|----|---|
| <u>3.1 PREPARATION<br/>(Cont'd)</u>      | .2 | (Cont'd)<br>.1 Development of cold joints not allowed.<br>.2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.<br><br>.3 Protect previous Work from staining.<br><br>.4 Clean and remove stains prior to application of concrete finishes.    |
| <u>3.2 INSTALLATION/<br/>APPLICATION</u> | .1 | Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.  |
|  | .2 | Sleeves and inserts:<br>.1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.<br>.2 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative DCC Representative Consultant. |
| <u>3.3 FINISHES</u>                      | .1 | Equipment pads: provide smooth trowelled surface.   |
| <u>3.4 CURING</u>                        | .1 | Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.   |
| <u>3.5 SEALING<br/>APPLICATION</u>       | .1 | After curing is complete, apply poly-siloxane resin blend sealer at 4 m <sup>2</sup> /L.  |
| <u>3.6 FIELD QUALITY<br/>CONTROL</u>     | .1 | Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative. Accelerated test methods will apply.   |
| <u>3.7 CLEANING</u>                      | .1 | Use trigger operated spray nozzles for water hoses.   |

3.7 CLEANING  
(Cont'd)

- .2 Designate cleaning area for tools to limit water use and runoff.
- .3 Cleaning of concrete equipment to be done in accordance with Section 01 35 43 Environmental Procedures.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 35 20 - Construction/Demolition Waste Management and Disposal
  - .1 Divert unused concrete materials from landfill to local quarry after receipt of written approval from Departmental Representative.
  - .2 Provide appropriate area on job site where concrete trucks and be safely washed.
  - .3 Divert admixtures and additive materials from landfill to approved official hazardous material collections site after receipt of written approval from Departmental Representative.
  - .4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.



PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-C22.1-15, Canadian Electrical Code, Part 1 (26th Edition), Safety Standard for Electrical Installations.
  - .2 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
  - .3 Do underground systems in accordance with CSA C22.3 No.7-15, Underground Systems, except where specified otherwise.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
  - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 The Ontario Electrical Safety Code 2015, and all bulletins (Ontario).
- .5 Hydro requirements and local applicable codes and regulations.

1.2 DESIGN  
REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
  - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates for control items in English.

1.3 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00.
- .2 Product Data: submit WHMIS MSDS in accordance with Section 01 35 29.
- .3 Shop drawings:

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1.3 SUBMITTALS  
(Cont'd)

- .3 (Cont'd)
  - .1 Submit drawings within 3 weeks of Award of Contract.
  - .2 Submit electronic copies of 190 x 279 mm minimum size drawings and product data to inspection authorities.
  - .3 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Quality Control: in accordance with Section 01 45 00.
  - .1 Provide CSA certified equipment and material.
  - .2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.
  - .3 Submit test results of installed electrical systems and instrumentation.
  - .4 Permits and fees: in accordance with General Conditions of contract. Pay associated fees. Departmental Representative will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
  - .5 Submit, upon completion of Work, load balance report as described in PART 3 - Load Balance.
  - .6 Submit certificate of acceptance from Electrical Inspection Department authority having jurisdiction upon completion of Work to Departmental Representative.

1.4 MEASUREMENT AND  
PAYMENT PROCEDURES

- .1 Work to be included in the balance of the project.

1.5 QUALITY  
ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices as per the conditions of Provincial Act respecting manpower vocational training and qualification.
  - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

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1.5 QUALITY  
ASSURANCE  
(Cont'd)

- .2 (Cont'd)  
.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.7 SYSTEM STARTUP

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

PART 2 - PRODUCTS

2.1 MATERIALS AND  
EQUIPMENT

- .1 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - Submittals.
- .2 Factory assemble control panels and component assemblies.

2.2 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of inspection authorities and Departmental Representative.
- .2 Decal signs, minimum size 175 x 250 mm.

2.3 WIRING  
TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for copper conductors.

2.4 EQUIPMENT  
IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
  - .1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.
  - .2 Lamicoid 3mm thick plastic engraving sheet red face, white core, mechanically attached with self tapping screws for essential (Emergency) power.
  - .3 Sizes as follows:
    - .1 Size 1: 1 line 3mm high letters
    - .2 Size 2: 1 line 5mm high letters
    - .3 Size 3: 1 line 3mm high letters
    - .4 Size 4: 2 lines 8mm high letters
- .2 Wordings on nameplates to be approved by Departmental Representative prior to manufacture.
- .3 Allow for minimum of twenty-five (25) letters per nameplate.
- .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .5 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .6 Terminal cabinets and pull boxes: indicate system and voltage.
- .7 Transformers: indicate capacity, primary and secondary voltages.

2.5 WIRING  
IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA-C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.6 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint outdoor electrical equipment "equipment green".
  - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA-C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.2 NAMEPLATES AND  
LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND  
CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
  - .1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

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3.3 CONDUIT AND  
CABLE INSTALLATION  
(Cont'd)

- .3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

3.4 MOUNTING  
HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.5 CO-ORDINATION  
OF PROTECTIVE  
DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 FIELD QUALITY  
CONTROL

- .1 Load Balance:
  - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
  - .2 Provide upon completion of work, load balance report as directed in PART 1 - Submittals: phase and neutral currents on panelboards, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00:
  - .1 Lighting and its control.
- .3 Carry out tests in presence of Departmental Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 CLEANING

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

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3.7 CLEANING  
(Cont'd)

- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- .3 At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt.
- .4 Remove construction materials from wiring devices, coverplates, outlets, cabinets, enclosures, tubs, etc.

3.8 POWER SHUTDOWN

- .1 Power shutdown shall be kept to a minimum. Schedule shutdowns well in advance with Department Representative stating time(s) and duration(s). Maintain all electrical services to the occupied areas of the buildings. Power shutdowns will be allowed during normal working hours and has to be approved by the institution. Shutdowns to be 4 hours maximum.
- .2 Provide temporary services, equipment and wiring as necessary to maintain continuity of services throughout, during construction of this project.
- .3 Ensure all services, ie. security, fire alarm, telephone, LAN, normal and essential power, etc. remain operational during construction.

3.9 REMOVALS

- .1 Remove existing electrical equipment, wiring, conduit and other devices.
- .2 Maintain continuity of power, lighting, fire alarm and communication circuits as required.
- .3 Turn over all removed material to the Departmental Representative as described.
- .4 Remove all existing redundant wiring associated with all devices.
- .5 Any material the Departmental Representative does not want shall be removed from the site by this contractor.

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3.10 OPERATION AND  
MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into operation and maintenance manuals.
- .2 Include in operation and maintenance data:
  - .1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
  - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.
  - .3 Wiring and schematic diagrams and performance curves.
  - .4 Names and addresses of local suppliers for items included in maintenance manuals.
  - .5 Copy of reviewed shop drawings.
- .3 Provide two distinct manuals, one for operational personnel and one for maintenance personnel. Provide a simplified operation instruction sheet for each system.

3.11 AS-BUILT  
RECORDS

- .1 As work progresses, maintain accurate records to show deviations from contract drawings. The Department Representative will provide a set of clean white prints for this purpose.

3.12 MAINTENANCE  
SCHEDULE

- .1 Provide information for a computerized maintenance schedule indicating regular maintenance checks, procedures and results for insertion into a computerized maintenance program at the institution by institution personnel.
  - ie. Equipment Number:
    - Manufacturer:
    - Voltage:
    - Phase:
    - Model:
    - Serial No.:
    - Etc.



PART 1 - GENERAL

1.1 PRODUCT DATA .1 Not Used.

1.2 REFERENCES .1 CSA C22.2 No .0.3-09, Test Methods for Electrical Wires and Cables.  
.2 CAN/CSA-C22.2 No. 131-14, Type TECK 90 Cable.

1.3 MEASUREMENT AND  
PAYMENT PROCEDURES .1 Work to be included in the balance of the project.

1.4 PRODUCT DATA .1 Provide product data in accordance with Section 01 33 00.

1.5 DELIVERY,  
STORAGE AND  
HANDLING .1 Packaging Waste Management: remove for reuse and return of pallets, crates, paddling and packaging materials.

PART 2 - PRODUCTS

2.1 LIGHTING WIRES .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.  
.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE, Non Jacketted.

PART 3 - EXECUTION

3.1 FIELD QUALITY  
CONTROL .1 Perform tests in accordance with Section 26 05 00.

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- 3.1 FIELD QUALITY CONTROL  
(Cont'd)
- .2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system. Section 26 05 43.01.
- cable trays in  
accordance with
- .2 Terminate cables in accordance with Section
- .2 Terminate cables in accordance with Section 26 05 43.01.
- .3 Cable Colour Coding: to Section 26 05 00.
- .4 Conductor length for parallel feeders to be identical.
- .5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .7 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- .8 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.
- 3.3 INSTALLATION OF BUILDING WIRES  
BUILDING WIRES
- .1 Install wiring as follows:
- .1 In conduit systems in accordance with Section 26 05 34.
- .2 In underground ducts in accordance with Section 26 05 43.01.

PART 1 - GENERAL

- |   |    |   |
|---|----|---|
| <u>1.1 RELATED<br/>SECTIONS</u>                   | .1 | Section 26 05 00 - Common Work Results - For Electrical.                  |
| <u>1.2 REFERENCES</u>                             | .1 | Grounding equipment based on CSA C22.2 No. 41-13.                         |
| <u>1.3 WASTE<br/>MANAGEMENT AND<br/>DISPOSAL</u>  | .1 | Separate and recycle waste materials in accordance with Section 01 74 20. |
| <u>1.4 MEASUREMENT AND<br/>PAYMENT PROCEDURES</u> | .1 | Work to be included in the balance of the project.                        |

PART 2 - PRODUCTS

- |                      |    |   |
|----------------------|----|---|
| <u>2.1 EQUIPMENT</u> | .1 | Rod electrodes: copper clad steel 19 mm dia by 3 m long.  |
|                      | .2 | Plate electrodes: copper, surface area 0.2 square meters, 1.6 mm thick.   |
|                      | .3 | Grounding conductors: bare stranded copper, soft annealed, size as indicated. Minimum #6 AWG.   |
|                      | .4 | Insulated grounding conductors: green, type RWU90.  |
|                      | .5 | Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to: <ul style="list-style-type: none"><li>.1 Grounding and bonding bushings.</li><li>.2 Protective type clamps.</li><li>.3 Bolted type conductor connectors.</li><li>.4 Thermit welded type conductor connectors.</li><li>.5 Bonding jumpers, straps.</li><li>.6 Pressure wire connectors.</li></ul> |

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PART 3 - EXECUTION

3.1 INSTALLATION  
GENERAL

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where PVC, flexible conduit and EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections to electrodes, using copper or inspectable wrought copper compression connectors to ANSI/IEEE 837.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Install bonding wire for flexible conduit, connected at both one ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .9 Install separate ground conductor to outdoor lighting standards.
- .10 Make grounding connections in radial configuration only, with connections terminating at single grounding point street side of water pipe. Avoid loop connections.

3.2 ELECTRODES

- .1 Install rod, electrodes and make grounding connections.
  - .2 Bond separate, multiple electrodes together.
  - .3 Use size 3/0 AWG copper conductors for connections to electrodes.
-

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3.2 ELECTRODES  
(Cont'd)

- .4 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 EQUIPMENT  
GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

3.4 FIELD QUALITY  
CONTROL

- .1 Perform tests in accordance with Section 26 05 00.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Canadian Standards Association (CSA International)
    - .1 CAN/CSA-C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
    - .2 CAN/CSA-C22.2 NO. 18.1-13, Metallic Outlet Boxes.
    - .3 CAN/CSA-C22.2 NO. 18.2-06, Nonmetallic Outlet Boxes.
    - .4 CSA C22.2 No. 45-M1981(R2008), Rigid Metal Conduit.
    - .5 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
    - .6 CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.
    - .7 CSA C22.2 No. 211.2-06 (R2016), Rigid PVC (Unplasticized) Conduit.

- 1.2 SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00.
  - .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
    - .1 Submit cable manufacturing data.
  - .3 Quality assurance submittals:
    - .1 Test reports: submit certified test reports.
    - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
    - .3 Instructions: submit manufacturer's installation instructions.

- 1.3 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
  - .2 Place materials defined as hazardous or toxic waste in designated containers.
  - .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.4 MEASUREMENT AND PAYMENT PROCEDURES .1 Work to be included in the balance of the project.

PART 2 - PRODUCTS

2.1 CONDUITS .1 Rigid pvc conduit: to CSA C22.2 No. 211.2.

2.2 CONDUIT FITTINGS .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.  
.2 Ensure factory "ells" where 90 degrees bends for NPS 1 27 mm and larger conduits.  
.3 Watertight connectors and couplings for EMT.  
.1 Set-screws are not acceptable.

2.3 FISH CORD .1 Polypropylene.

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 datasheets.

3.2 INSTALLATION .1 Use rigid pvc conduit underground.  
.2 Minimum conduit size for lighting and power circuits: NPS 3/4 21 mm.  
.3 Bend conduit cold:  
.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.  
.4 Mechanically bend steel conduit over 21 mm diameter.  
.5 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

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- 3.2 INSTALLATION  
(Cont'd)
- .6 Install fish cord in empty conduits.
  - .7 Remove and replace blocked conduit sections.
    - .1 Do not use liquids to clean out conduits.
  - .8 Dry conduits out before installing wire.

- 3.3 CONDUITS  
UNDERGROUND
- .1 Slope conduits to provide drainage.
  - .2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

- 3.4 CLEANING
- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.



PART 1 - GENERAL

|   |    |   |
|---|----|---|
| <u>1.1 RELATED<br/>SECTIONS</u>                   | .1 | Section 31 23 33.01 - Excavating, Trenching and Backfilling.  |
| <u>1.2 REFERENCES</u>                             | .1 | Canadian Standards Association, (CSA International)   |
|   | .2 | Insulated Cable Engineers Association, Inc. (ICEA)  |
| <u>1.3 WASTE<br/>MANAGEMENT AND<br/>DISPOSAL</u>  | .1 | Separate and recycle waste materials in accordance with Section 01 74 20.   |
|   | .2 | Remove from site and dispose of all packaging materials at appropriate recycling facilities.  |
|   | .3 | Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan. |
|   | .4 | Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.                 |
|   | .5 | Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.  |
|   | .6 | Do not dispose of preservative treated wood through incineration.   |
|   | .7 | Do not dispose of preservative treated wood with other materials destined for recycling or reuse.   |
|   | .8 | Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.  |
|   | .9 | Fold up metal banding, flatten and place in designated area for recycling.  |
| <u>1.4 MEASUREMENT AND<br/>PAYMENT PROCEDURES</u> | .1 | Work to be included in the balance of the project.  |

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### PART 3 - EXECUTION

#### 3.1 CABLE INSTALLATION IN DUCTS

- .1 Install cables as indicated in ducts.
- .2 Do not pull spliced cables inside ducts.
- .3 Install multiple cables in duct simultaneously.
- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .7 After installation of cables, seal duct ends with duct sealing compound.

#### 3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00.
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 Check phase rotation and identify each phase conductor of each feeder.
- .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- .5 Pre-acceptance tests.
  - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
  - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
- .6 Acceptance Tests
  - .1 Ensure that terminations and accessory equipment are disconnected.

- 3.2 FIELD QUALITY CONTROL  
(Cont'd)
- .6 (Cont'd)
- .2 Ground shields, ground wires, metallic armour and conductors not under test.
- .3 High Potential (Hipot) Testing.
- .1 Conduct hipot testing at 100% of original factory test voltage in accordance with manufacturer's ICEA recommendations.
- .7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

PART 1 - GENERAL

1.1 Related .1 Section 26 05 00  
Requirements

1.2 References .1 CSA International  
.1 CSA C22.2 No. 5-16, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breakers Enclosures (Tri-national standard with UL-489, and NMX-J-266-ANCE-2016).

1.3 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 circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates  
.1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit 3 copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards regulations.  
.1 Production certificate of origin must be submitted to Departmental Representative for approval.  
.2 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.  
.3 Any Work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Departmental Representative. Unless complying with this requirements, Departmental Representative reserves the right to mandate manufacture listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.

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1.3 Submittals  
(Cont'd)

- .3 (Cont'd)
- .4 Production certificate of origin must contain:
  - .1 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.
  - .2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.
  - .3 Contractor's name and address and person responsible for project.
  - .4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.

1.4 Delivery,  
Storage and  
Handling

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions
- .2 Delivert and Acceprance Requirements: deliver materials to site in original factory packaging, lavelled with manufacturer's name and address.

PART 2 - PRODUCTS

2.1 Breakers  
General

- .1 Moulded-case circuit, ground-fault circuit-interrupters, fused circuit and accessory high-fault protectors: to CSA C22.2 No. 5
- .2 Bolt-on moulded case circuit breaker: quick-make,quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient
- .3 Plug-in moulded case circuit breakers:quick-make,quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient
- .4 Common-trip breakers: with single handle for multi-pole applications.
- .5 Magentic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
  - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

|  |    |  |
|--|----|--|
| 2.1 Breakers<br>General<br>(Cont'd)  | .6 | Circuit breakers with interchangeable trips as indicated.  |
|  | .7 | Circuit breakers to have minimum 10kA symmetrical rms interrupting capacity rating.  |
| 2.2 Thermal<br>Magnetic Breakers<br>(Design A)   | .1 | Moulded-case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.  |
| 2.3 Magnetic<br>Breakers (Design B)  | .1 | Moulded-case circuit breaker to operate automatically by means of magnetic tripping for short circuit protection.  |
| 2.4 Current<br>Limiting and Series<br>Rated Thermal<br>Magnetic Breakers<br>(Design C) | .1 | Thermal magnetic breakers with current limiters<br>.1 Time current limiting characteristics of fuses limiters coordinated with time current tripping characteristics of circuit breaker<br>.2 Co-ordination to result in interruption by breaker of fault-level currents up to interrupting capacity of breaker. |
|  | .2 | Series rated breakers to be manufacturer tested and listed. Breakers to be applied following manufacturer's guidelines and accepted best practice.<br>.1 Breakers applied following manufacturer's guidelines and accepted best practice.  |
| 2.5 Solid State<br>Trip Breakers<br>(Design D)   | .1 | Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, tripping for ground fault short circuit protection.  |

PART 3 - EXECUTION

- 3.1 Examination .1 Verification of Conditions verify conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative
- .2 Inform Departmental 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 Departmental Representative.
- 3.2 Installation .1 Install circuit breakers as indicated and in accordance with manufacturer's written instructions.
- [REDACTED]

PART 1 - GENERAL

- |  |    |   |
|--|----|---|
| <u>1.1 RELATED<br/>SECTIONS</u>                        | .1 | Section 01 33 00 Submittal Procedures.  |
|  | .2 | Section 01 74 20 - Construction/Demolition Waste Management and Disposal.   |
|  | .3 | Section 26 05 00 - Common Work Results - Electrical.  |
|  | .4 | Section 03 20 00 - Concrete Reinforcing.  |
|  | .5 | Section 03 30 00.01 - Cast-In-Place Concrete.   |
| <u>1.2 REFERENCES</u>                                  | .1 | Canadian Standards Association (CSA International)  |
|  | .1 | CSA A14-07(R2012), Concrete Poles.  |
|  | .2 | CSA C22.2 No.206-13, Lighting Poles.  |
|  | .3 | CAN/CSA-O15-15, Wood Utility Poles and Reinforcing Stubs.   |
|  | .4 | CSA O80 Series-15, Wood Preservation.   |
| <u>1.3 MEASUREMENT AND<br/>PAYMENT PROCEDURES</u>      | .1 | Work to be included in the balance of the project.  |
| <u>1.4 ACTION AND<br/>INFORMATIONAL<br/>SUBMITTALS</u> | .1 | Submit product data in accordance with Section 01 33 00 - Submittal Procedures.   |
| <u>1.5 WASTE<br/>MANAGEMENT AND<br/>DISPOSAL</u>       | .1 | Separate and recycle waste materials in accordance with Section 01 74 20 - Construction/Demolition Waste Management And Disposal. |

PART 2 - PRODUCTS

- |                           |    |  |
|---------------------------|----|--|
| <u>2.1 ALUMINUM POLES</u> | .1 | Aluminum poles: to CSA C22.2 No.206 designed for underground wiring and: |
|                           | .1 | Mounting on concrete anchor base.  |
|                           | .2 | Style: Monotube, round tapered aluminum, wall thickness 4.5 mm.          |
-



- 
- |  |    |  |
|--|----|--|
| <u>2.1 ALUMINUM POLES<br/>(Cont'd)</u>     | .1 | (Cont'd)<br>.3 Straight for one or two luminaire mounting brackets.<br>.4 Access handhole 300mm above pole base for wiring connections, with welded-on reinforcing frames bolted-on cover.<br>.5 Size: As indicated.<br>.6 Anchor bolts: 20mm x 75mm steel with shims, nuts, washers and covers.<br>.7 Finish: semi-lustrous satin by rotary sand process.<br>.8 Grounding lug.<br>.9 Length is 7.6m (25 feet). Diameter is 125mm(5 inches).   |
| <br>                                       |    |  |
| <u>2.2 CONCRETE POLE<br/>BASE</u>          | .1 | Concrete pole bases and reinforcement as indicted on contract drawings.  |
|  | .2 | Concrete work and reinforcing in accordance with Section 03 20 00 and Section 03 30 00.  |
| <br>                                       |    |  |
| <u>2.3 LUMINAIRE<br/>MOUNTING BRACKETS</u> | .1 | Mounting brackets aluminum for specified luminaires:<br>.1 Single and double brackets as indicated.<br>.2 Arm extension length: As indicated.<br>.3 Single and double davit type.  |
| <br>                                       |    |  |
| <u>2.4 LUMINAIRES</u>                      | .1 | Exterior Luminaires:<br>.1 Enclosure: One piece diecast, with internal cooling, solid barrier walls seperating optical and electrical compartment. Single diecast aluminum cam-latch providing positive locking and sealing of driver chamber, one peice vulcanised silicon gasket separate LED driver tray and compartment for maximum heat dissipation IP66 Rating.<br>.2 Support Arm: heavy cast, powder coated with stainless steel mounting for specified pole mounting.<br>.3 Lamp, Housing specifications as follows: |
-

2.4 LUMINAIRES  
(Cont'd)

- .1 (Cont'd)
- .3 (Cont'd)
  - .1 Type III for fixture Type 'D', Type V for fixture Types 'B' and 'C', 347V, 90 W, LED, 10,000 lumens, 99% projected lumen maintenance factor at 50000 hours, 5 year warranty on luminaire and driver. Type III for fixture Type 'D', Type V for fixtures Types 'B' and 'C' light distribution.
  - .4 Mounting configuration as identified on Drawings:
    - .1 All fixtures and poles to be finished with Platinum Silver colour.
    - .5 LED fixtures must be DLC compliant.
    - .6 LED's to be LM79 and LM80 compliant.
    - .7 Fixture manufacturer must have been in business for at least 5 years.
    - .8 Suitable fixtures are:
      - .1 Type B:
        - .1 Single Philips Lumec Street View, Catalogue#SVM90W-48LED4K-R-LE5-HVU-DMG-RC-SPI-PH8/347.
      - .2 Type C:
        - .1 Back-Back Philips Lumec Street View, Catalogue #SVM90W-48LED4K-R-LE5-HVU-DMG-RC-SPI-PH8/347.
      - .3 Type D:
        - .1 Single Philips Lumec Street View, Catalogue #SVM90W-48LED4K-R-LE3-HVU-DMG-RC-SPI-PH8/347.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install concrete pole base as indicated on contract drawings.
- .2 Install poles true and plumb, complete with brackets in accordance with manufacturer's instructions.
- .3 Install luminaires on pole davits and install lamps.
- .4 Check luminaire orientation, level and tilt.
- .5 Connect luminaire to lighting circuit.

- |                              |    |   |
|------------------------------|----|---|
| 3.1 INSTALLATION<br>(Cont'd) | .6 | Perform tests in accordance with Section 26 05 00<br>- Common Work Results - Electrical.                              |
|                              | .7 | Provide underground duct banks and conduits as<br>indicated on drawings.  |
|                              | .8 | Scan existing underground circuits and relocate<br>existing wiring to lighting standards as indicated<br>on drawings. |

PART 1 - GENERAL

- |   |    |   |
|---|----|---|
| <u>1.1 RELATED<br/>SECTIONS</u>                   | .1 | Section 31 23 33.01 - Excavating, Trenching and Backfilling   |
| <u>1.2 DEFINITIONS</u>                            | .1 | Rock: any solid material in excess of 0.25 m <sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m <sup>3</sup> bucket. Frozen material not classified as rock. |
| <u>1.3 MEASUREMENT AND<br/>PAYMENT PROCEDURES</u> | .1 | Measure rock removal in plan cubic meters (m <sup>3</sup> ) removed. Measurement to be verified with Departmental Representative. All additional work is to be included in balance of the project.                            |

PART 2 - PRODUCTS

- |                      |    |           |
|----------------------|----|-----------|
| <u>2.1 MATERIALS</u> | .1 | Not used. |
|----------------------|----|-----------|

PART 3 - EXECUTION

- |                         |    |  |
|-------------------------|----|--|
| <u>3.1 PROTECTION</u>   | .1 | Prevent damage to surroundings and injury to persons by erecting appropriate protective barriers to the approval of a Department Representative. |
| <u>3.2 ROCK REMOVAL</u> | .1 | Remove rock to alignments, profiles, and cross sections as indicated.  |
|                         | .2 | Rock shall be removed by mechanical means.   |
|                         | .3 | Explosive blasting is not permitted.   |
|                         | .4 | Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.   |
-

3.2 ROCK REMOVAL  
(Cont'd)

- .5 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.
- .6 Excavate trenches to lines and grades as indicated on contract drawings. Provide recesses for bell and spigot pipe to ensure bearing will occur uniformly along barrel of pipe.
- .7 Cut trenches to widths as indicated.
- .8 Remove boulders and fragments which may slide or roll into excavated areas.
- .9 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01.

3.3 ROCK DISPOSAL

- .1 Dispose of surplus removed rock off site in accordance with section 01 74 20.

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 31 23 16.26.

1.2 REFERENCES .1 American Society for Testing and Materials International (ASTM)  
.1 ASTM C117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.  
.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.  
.3 ASTM D422-63(2007)e1, Standard Test Method for Particle-Size Analysis of Soils.  
.4 ASTM D698-12ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).  
.5 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).  
.6 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.  
.2 Canadian General Standards Board (CGSB)  
.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.  
.3 Canadian Standards Association (CSA International)  
.1 CAN/CSA-A3000-08, Cementitious Materials Compendium.  
.2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 DEFINITIONS .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation. Refer to Section 31 23 16.26.  
.1 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation, including asphalt, concrete, shrubs, roots, stones, topsoil, etc.  
.2 Topsoil:

1.3 DEFINITIONS  
(Cont'd)

- .2 (Cont'd)
  - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .4 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .5 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318-10e1, and gradation within limits specified when tested to ASTM D422-63(2007)e1 and ASTM C136-06.
- .6 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 SUBMITTALS

- .1 Quality Control:
  - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
  - .2 Submit for review by Department Representative proposed dewatering and sediment control methods as described in PART 3 of this Section.
  - .3 Submit to Department Representative plan for stockpiling, material storage, and staging area.
- .2 Preconstruction Submittals:
  - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.

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| 1.4 SUBMITTALS<br>(Cont'd)                | .2 | (Cont'd)   |
|   | .2 | Submit records of underground utility locates, indicating: location plan of existing utilities as found in field and clearance record from utility authority.  |
| 1.5 MEASUREMENT AND<br>PAYMENT PROCEDURES | .1 | Measure Granular 'A' included in work in tonnes. All additional work is to be done in balance of project.  |
|   | .2 | Measure Granular 'B' included in work in tonnes. All additional work is to be done in balance of project.  |
| 1.6 WASTE<br>MANAGEMENT AND<br>DISPOSAL   | .1 | Separate waste materials for reuse and recycling in accordance with Section 01 74 20.  |
| 1.7 EXISTING<br>CONDITIONS                | .1 | <p>Buried services:</p> <p>.1 Before commencing work verify location of buried services on and adjacent to site. Utility locates by owner of the utility or authorities having jurisdiction are required prior to commencement of work.</p> <p>.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.</p> <p>.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.</p> <p>.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.</p> <p>.5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.</p> <p>.6 Where utility lines or structures exist in area of excavation, obtain direction of Department Representative before removing or re-routing. Costs for such Work to be paid by Owner.</p> <p>.7 Record location of maintained, re-routed and abandoned underground lines.</p> |
|   | .2 | Existing buildings and surface features:   |
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| 1.7 EXISTING<br>CONDITIONS<br>(Cont'd) | .2 (Cont'd) |
|--|-------------|
- .1 Conduct, with Department Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by Work.
- .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Department Representative.

## PART 2 - PRODUCTS

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|---------------|--|
| 2.1 MATERIALS | .1 Granular A material as per OPSS 1010. |
|---------------|--|
- .2 Granular B material, Type II as per OPSS 1010.
- .3 Select sub-grade material as per OPSS 1010.
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|--|--|
|  | .4 Unshrinkable fill: proportioned and mixed to provide: |
|--|--|
- .1 Maximum compressive strength of 0.4 MPa at 28 days.
- .2 Maximum cement content of 25 kg/m<sup>3</sup> with 40 % by volume fly ash replacement: to CSA-A3001, Type GU.
- .3 Minimum strength of 0.07 MPa at 24 h.
- .4 Concrete aggregates: to CSA-A23.1/A23.2.
- .5 Cement: Type GU.
- .6 Slump: 160 to 200 mm.

## PART 3 - EXECUTION

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|----------------------------|---|
| 3.1 GEOTECHNICAL<br>REPORT | .1 Refer to Appendix B: Soils Investigation Report (WSP, 2016) for site specific information. |
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|--|---|
| 3.2 TEMPORARY<br>EROSION AND<br>SEDIMENTATION<br>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 sediment and erosion control drawings and Environmental Protection specification. |
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| 3.2 TEMPORARY<br>EROSION AND<br>SEDIMENTATION<br>CONTROL<br><u>(Cont'd)</u> | .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.  |
| 3.3 SITE<br>PREPARATION<br><u></u>  | .1 | Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.  |
|   | .2 | Sawcut pavement or neatly along limits of proposed excavation in order that surface may break evenly and cleanly.  |
| 3.4 PREPARATION/<br>PROTECTION<br><u></u>                                   | .1 | Protect existing features as required.   |
|   | .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 Department Representative'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 required to remain undisturbed.   |
| 3.5 STRIPPING OF<br>TOPSOIL<br><u></u>                                      | .1 | Begin topsoil stripping of areas after area has been cleared of brush and weeds and removed off site.  |
|   | .2 | Do not mix topsoil with subsoil.   |
|   | .3 | Stockpile in locations as directed by Department Representative.<br>.1 Stockpile height not to exceed 2 m and should be protected from erosion.  |
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### 3.6 STOCKPILING

- .1 Stockpile fill materials in areas designated by Department Representative.
  - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into storm sewers and water bodies.

### 3.7 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Department Representative approval details of proposed dewatering or heave prevention methods, including well points (if applicable).
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water in manner not detrimental to public and private property, or portion of Work completed or under construction.
  - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits as required.

### 3.8 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
  - .2 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation under this item.
  - .3 Excavation must not interfere with bearing capacity of adjacent foundations.
  - .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
    - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
-

3.8 EXCAVATION  
(Cont'd)

- .5 For trench excavation, unless otherwise authorized by Department Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .6 Keep excavated and stockpiled materials safe distance away from edge of trench.
- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Do not obstruct flow of surface drainage or natural watercourses.
- .9 Excavated catchbasins, pipes, frames, concrete, etc. to be disposed off site.
- .10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Department Representative.
- .12 Correct unauthorized over-excavation as follows:
  - .1 Fill under bearing surfaces and footings with granular A compacted to not less than 100 % of corrected Standard Proctor maximum dry density.
  - .2 Fill under other areas with granular A fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.
- .13 Hand trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
- 14. Excavated topsoil and subgrade not to reused for reinstatement, to be disposed off site.  
Coordinate with Department Representative.

3.9 FILL TYPES AND  
COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698ASTM D 1557.

3.10 BEDDING AND  
SURROUND OF  
UNDERGROUND  
SERVICES

- .1 Place and compact granular "A" material for bedding and surround of underground services as per detail drawings. Cover material to extend to 300 mm above pipe obvert.
- .2 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Department Representative has inspected and approved installations.
  - .2 Department Representative has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
  - .4 Removal of concrete formwork.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 200 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Place layers simultaneously on both sides of installed Work to equalize loading.

3.12 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 20, trim slopes, and correct defects as directed by Department Representative.
  - .2 Replace all disturbed topsoil as specified and to the satisfaction of the Department Representative.
  - .3 Reinstate lawns to elevation which existed before excavation (or as indicated).
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|------------------------------|----|--|
| 3.12 RESTORATION<br>(Cont'd) | .4 | Reinstate pavements disturbed by excavation to thickness, structure and elevation which existed before excavation. |
|                              | .5 | Clean and reinstate areas affected by Work as directed by the Department Representative.                           |
|                              | .6 | Protect newly graded areas from traffic and maintain free of trash or debris.                                      |

PART 1 - GENERAL

1.1 DELIVERY AND STORAGE .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.2 MEASUREMENT AND PAYMENT PROCEDURES .1 All additional Geotextile placement is to be included in the balance of project.

PART 2 - PRODUCTS

2.1 MATERIAL .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.

.2 Seams: sewn or lapped in accordance with manufacturer's recommendations.

.3 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

.4 Physical properties:

.1 Thickness: to CAN/CGSB-148.1-M85, number 3 minimum 3.5 mm.

.2 Mass per unit area: to CAN/CGSB-148.1-M85, number 2, minimum 375 g/m.

.3 Tensile strength and elongation (in any principal direction): to CAN/CGSB-4.2-90, method 9.2.

.1 Tensile strength: minimum 690 N, wet condition.

.2 Seam strength: equal to or greater than tensile strength of fabric.

.3 Mullen burst strength: to CAN/CGSB-4.2-M88, method 11.1, minimum 2.2 kPa, wet condition.

PART 3 - EXECUTION

3.1 INSTALLATION .1 Place geotextile material along the side of existing shoreline as indicated on the drawing.

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3.1 INSTALLATION  
(Cont'd)

- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Overlap each successive strip of geotextile 500 mm over previously laid strip.
- .4 Join successive strips of geotextile by sewing.
- .5 Protect geotextile material from displacement and damage during placement of filter stone material.
- .6 Replace damaged or deteriorated geotextile.



PART 1 - GENERAL

- |   |    |   |
|---|----|---|
| <u>1.1 MEASUREMENT AND<br/>PAYMENT PROCEDURES</u> | .1 | Measure Rip-rap included in work in square meters (m <sup>2</sup> ). All additional work is to be included in balance of project. |
|---|----|---|

PART 2 - PRODUCTS

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|----------------------------------|----|--|
| <u>2.1 STONE</u>                 | .1 | Hard, dense with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet the following size distribution for use intended as per OPSS 1004 R-10:<br>.1 Remaining percentage of total volume to have uniform distribution of stones between 5 and 15 dm3.<br>.2 Rip rap shall be irregular stone having a minimum dimension not less than 100mm in any one direction to meet size requirements as indicated on Drawings and in accordance to OPSS 1004. |
| <u>2.2 GEOTEXTILE<br/>FILTER</u> | .1 | Geotextile: to section 31 32 21.   |

PART 3 - EXECUTION

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|--------------------|----|---|
| <u>3.1 PLACING</u> | .1 | Place rip-rap as indicated on Drawings.   |
|                    | .2 | Where rip-rap is to be placed on slopes, excavate a trench at toe of slope to dimensions indicated or directed.   |
|                    | .3 | Fine grade area to be rip-rapped to a uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.   |
|                    | .4 | Place geotextile on prepared surface in accordance with Section 31 32 21 - Geotextiles, and as indicated on Drawings. Place rip rap on geotextile so as to avoid puncturing geotextile. |
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3.1 PLACING  
(Cont'd)

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- .5 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place large stones at bottom of slopes.
- .6 Rip rap shall be placed such that the larger rocks are uniformly distributed and the smaller rocks serve to fill the spaces between the larger rocks in such manner as will result in a stable, densely placed layer of uniform thickness and regular surface. Hand placing will be required only to the extent necessary to secure the surfaces.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International).
  - .1 CSA G30.5, Welded Steel Wire Fabric for Concrete Reinforcement.
- .2 Health Canada - Pest Management Regulatory Agency (PMRA).
  - .1 National Standard for Pesticide Education, Training and Certification in Canada (1995).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00.

1.3 QUALITY  
ASSURANCE

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.

1.4 MEASUREMNT AND  
PAYMENT PROCEDURES

- .1 All work to be included in the balance of the project.

PART 3 - EXECUTION

2.1 IDENTIFICATION  
AND PROTECTION

- .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- .2 Identify plants and limits of root systems to be preserved as approved by Departmental Representative.
- .3 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by Departmental Representative.

2.1 IDENTIFICATION  
AND PROTECTION  
(Cont'd)

- .4 Ensure no pruning is done inside drip line. If pruning inside drip line is required consult an arborist or Canadian Certified Horticultural Technician (CCHT) as approved by Departmental Representative.
- .5 Tree barrier 1.5m from drip line or 7.3m from the base of the trees.

2.2 ROOT CURTAIN  
SYSTEM

- .1 Identify limits for required construction excavation as approved by Departmental Representative.
- .2 Prior to construction excavation, hand dig trench minimum 500 mm wide x 1500 mm deep, along perimeter of excavation limits.
- .3 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.
- .4 Install wooden posts recycled composite plastic posts and welded wire fabric against construction edge of trench.
- .5 Securely attach Type 2 filter fabric on plant side of wire mesh.
- .6 Prepare homogeneous mixture of fertilizer, parent material and organic matter.
  - .1 Add organic matter to mixture to achieve 7-9 % organic matter content by weight.
  - .2 Incorporate with mixture grade 2:12:8 ratio fertilizer (dry) at rate of 1.5 kg/m<sup>3</sup>.
- .7 Backfill with homogeneous mixture between curtain wall and plants to be preserved in layers not exceeding 150 mm in depth. Compact each layer to 85 % Standard Proctor Density.
- .8 Protect root curtain from damage during construction operations.
- .9 Water plants and root curtain sufficiently during construction to maintain optimum soil moisture condition until backfill operations are complete.
- .10 Protect Remove root curtain before during backfill operations. Ensure root curtain is cut down to 300 mm below finished grade and remove cut material.

|                                   |    |   |
|-----------------------------------|----|---|
| 2.3 AIR LAYERING<br><u>SYSTEM</u> | .1 | Aerate the root system using deep root<br>fertilization in the spring and in the fall with<br>vertical mulching of the soil |
|-----------------------------------|----|---|

PART 1 - GENERAL

|  |    |   |
|--|----|---|
| <u>1.1 RELATED<br/>SECTIONS</u>                  | .1 | Section 32 11 23 - Agregate Base Courses Section<br>Section 32 12 16.01 - Asphalt Paving  |
| <u>1.2 REFERENCES</u>                            | .1 | American Society for Testing and Materials (ASTM)<br>.1 ASTM C 117-95, Standard Test Methods for<br>Material Finer Than 0.075 mm Sieve in Mineral<br>Aggregates by Washing.<br>.2 ASTM C 131-96, Standard Test Method for<br>Resistance to Degradation of Small-Size Coarse<br>Aggregate by Abrasion and Impact in the Los<br>Angeles Machine.<br>.3 ASTM C 136-96a, Standard Test Method for<br>Sieve Analysis of Fine and Coarse Aggregates.<br>.4 ASTM D 422-63(1998), Standard Test Method for<br>Particle-Size Analysis of Soils.<br>.5 ASTM D 698-00a, Standard Test Methods for<br>Laboratory Compaction Characteristics of Soil<br>Using Standard Effort (12,400ft-lbf/ft <sup>3</sup> )<br>(600kN-m/m <sup>3</sup> ).<br>.6 ASTM D 1557-00, Test Method for Laboratory<br>Compaction Characteristics of Soil Using Modified<br>Effort (56,000ft-lbf/ft <sup>3</sup> ) (2,700kN-m/m <sup>3</sup> ).<br>.7 ASTM D 1883-99, Standard Test Method for CBR<br>(California Bearing Ratio) of Laboratory Compacted<br>Soils.<br>.8 ASTM D 4318-00, Standard Test Methods for<br>Liquid Limit, Plastic Limit and Plasticity Index<br>of Soils.<br>.2 Canadian General Standards Board (CGSB)<br>.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire,<br>Inch Series.<br>.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven<br>Wire, Metric. |
| <u>1.3 WASTE<br/>MANAGEMENT AND<br/>DISPOSAL</u> | .1 | Separate and recycle waste materials in accordance<br>with Section 01 74 21.<br>.2 Divert unused granular material from landfill to<br>local quarry as approved by Departmental<br>Representative.  |

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- 1.4 MEASUREMENT AND  
PAYMENT PROCEDURES
- .1 Measure Granular 'A' included in work in tonnes.  
All additional work to be included in the balance  
of the project.
  - .2 Measure Granular 'B' included in work in tonnes.  
All additional work to be included in the balance  
of the project.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Granular sub-base material: in accordance with  
following requirements:
    - .1 Crushed, pit run or screened stone, gravel or  
sand.
    - .2 Granulars to OPSS 1010

PART 3 - EXECUTION

- 3.1 PLACING
- .1 Place granular sub-base after subgrade is  
inspected and approved by Departmental  
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 Place granular sub-base materials using methods  
which do not lead to segregation or degradation.
  - .6 Place material to full width in uniform layers not  
exceeding 150 mm compacted thickness. Departmental  
Representative may authorize thicker lifts  
(layers) if specified compaction can be achieved.
  - .7 Shape each layer to smooth contour and compact to  
specified density before succeeding layer is  
placed.
  - .8 Remove and replace portion of layer in which  
material has become segregated during spreading.
-

### 3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% maximum dry density in accordance with ASTM D 1557.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### 3.3 SITE TOLERANCES

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

### 3.4 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.



PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C 117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .5 ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
  - .6 ASTM D 1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.2 MEASUREMENT  
PROCEDURES

- .1 Included in Balance of Project.

1.3 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 20 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

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|----------------------|----|--|
| <u>2.1 MATERIALS</u> | .1 | Granular base: Granular A material as per OPSS 1010. |
|----------------------|----|--|

PART 3 - EXECUTION

- |                                  |    |  |
|----------------------------------|----|--|
| <u>3.1 SEQUENCE OF OPERATION</u> | .1 | Place granular base after sub-base surface is inspected and approved by Departmental Representative.   |
|                                  | .2 | Placing <ul style="list-style-type: none"><li>.1 Construct granular base to depth and grade in areas indicated.</li><li>.2 Ensure no frozen material is placed.</li><li>.3 Place material only on clean unfrozen surface, free from snow and ice.</li><li>.4 Place material using methods which do not lead to segregation or degradation of aggregate.</li><li>.5 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.</li><li>.6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.</li><li>.7 Remove and replace that portion of layer in which material becomes segregated during spreading.</li></ul> |
|                                  | .3 | Compaction Equipment <ul style="list-style-type: none"><li>.1 Compaction equipment to be capable of obtaining required material densities.</li></ul>   |
|                                  | .4 | Compacting <ul style="list-style-type: none"><li>.1 Compact to density not less than 100% corrected maximum dry density.</li><li>.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.</li><li>.3 Apply water as necessary during compacting to obtain specified density.</li><li>.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.</li></ul>  |
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- |   |    |  |
|---|----|--|
| 3.1 SEQUENCE OF<br>OPERATION<br><u>(Cont'd)</u> | .4 | (Cont'd)   |
|   | .5 | Correct surface irregularities by<br>loosening and adding or removing material<br>until surface is within specified tolerance.                                   |
| <br>3.2 SITE TOLERANCES                         | .1 | Finished base surface to be within plus or<br>minus 10 mm of established grade and cross<br>section but not uniformly high or low.                               |
| <br>3.3 PROTECTION                              | .1 | Maintain finished base in condition conforming<br>to this Section until succeeding material is<br>applied or until acceptance by Departmental<br>Representative. |

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 32 11 16.01 - Granular Sub-base.

1.2 REFERENCES .1 American Society for Testing and Materials International, (ASTM)  
.1 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).  
.2 Canadian General Standards Board (CGSB)  
.1 CAN/CGSB-1.74-2001, Alkyd Traffic Paint.  
.3 Ontario Provincial Standard Specifications (OPSS)  
.1 OPSS 302-November 2007, Construction Specification for Primary Granular Base.  
.2 OPSS 310-November 2012, Construction Specification for Hot Mixed Asphalt.  
.3 OPSS 314-November 2013, Construction Specification for Untreated Granular, Subbase, Base, Surface Shoulder and Stockpiling.  
.4 OPSS 1010-November 2013, Material Specification for Aggregates, Subbase, Select Subgrade, and backfill material.  
.5 OPSS 1103-November 2012, Material Specification for Emulsified Asphalt.  
.6 OPSS 1150-November 2010, Material Specification for Hot Mixed, Hot Laid Asphalt Concrete.

1.3 SAMPLES .1 Submit to Department Representative, the asphalt mix design at least 2 weeks before paving work.

1.4 MEASUREMENT AND PAYMENT PROCEDURES .1 Measure Granular 'A' included in work in tonnes. All additional work to be included in the balance of the project.  
.2 Measure Granular 'B' included in work in tonnes. All additional work to be included in the balance of the project.

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|  |    |  |
|--|----|--|
| <u>1.4 MEASUREMENT AND<br/>PAYMENT PROCEDURES<br/>(Cont'd)</u> | .3 | Measure Hotmix Asphalt (HL-3 at 50mm) included in work in tonnes placed. All additional work to be included in the balance of the project. |
|--|----|--|

|  |    |   |
|--|----|---|
| <u>1.5 WASTE<br/>MANAGEMENT AND<br/>DISPOSAL</u> | .1 | Separate and recycle waste materials in accordance with Section 01 74 20. |
|--|----|---|

## PART 2 - PRODUCTS

|                      |    |  |
|----------------------|----|--|
| <u>2.1 MATERIALS</u> | .1 | Aggregates to: OPSS 1010.<br>.1 Granular A.<br>.2 Granular B Type II.<br>.3 Select subgrade. |
|                      | .2 | Prime coat: SS-1 to OPSS 1103.   |
|                      | .3 | Asphalt concrete: HL-3 to OPSS 1150.   |
|                      | .4 | Asphaltic joint sealant between existing and new asphalt: to ASTM D6690.                     |
|                      | .5 | The performance grade of asphalt as per Appendix B, Table A-1 OPSS 1101.                     |
|                      | .6 | Traffic paint: Alkyd yellow (505-308) and white(513-301) to CAN/CGSB-1.74 and OPSS 1712.     |
|                      | .7 | Paint thinner: to CAN/CGSB-1.5.  |

## PART 3 - EXECUTION

|                                   |    |   |
|-----------------------------------|----|---|
| <u>3.1 PAVEMENT<br/>THICKNESS</u> | .1 | As per cross section on detail drawing. |
|-----------------------------------|----|---|

|                                      |    |   |
|--------------------------------------|----|---|
| <u>3.2 PAVEMENT<br/>CONSTRUCTION</u> | .1 | Application of tack coat: OPSS 1103. Apply only on clean and dry surface. Paint contact surfaces of curbs, gutters, manholes and like structures with thin, uniform coat of asphalt tack coat material. |
|                                      | .2 | Construction of asphalt concrete: OPSS 310.   |

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3.3 ASPHALT  
MARKINGS

- .1 Paint stop lines, centre lines and other pavement markings in accordance with manufacturers recommendations and as indicated.
- .2 Review layout with Department Representative prior to application.
- .3 Use paint thinner in accordance with manufacturer's requirements.
- .4 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.
- .5 Air temperature to be above 10°C, wind speed less than 60 km/h and no rain in forecast within next 4 hours.
- .6 Paint lines to be of uniform colour and density with sharp edges.
- .7 Remove incorrect markings as directed by Department Representative.

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 01 74 20.

1.2 REFERENCES .1 Canadian General Standards Board (CGSB)  
.1 CAN/CGSB-15.1-92, Calcium Chloride, type S.

1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 Included in Balance of Project.

1.4 DELIVERY STORAGE AND HANDLING .1 Supply calcium chloride in quantities and at times as directed by Department Representative.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Calcium chloride, Calcium Chloride solid Grade 1, Class A s per OPSS 2501.

PART 3 - EXECUTION

3.1 APPLICATION .1 Apply calcium chloride and water with equipment approved by , and, when directed by Department Representative.

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 32 11 23 - Aggregate Base Courses.

1.2 REFERENCES .1 American Society for Testing and Materials International (ASTM)  
.1 ASTM C 117-04, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.  
.2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.  
.3 ASTM D 260-86(2001), Standard Specification for Boiled Linseed Oil.  
.4 ASTM D 698-00a1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).  
.2 Canadian General Standards Board (CGSB)  
.1 CAN/CGSB-3.3-99(March 2004), Kerosene, Amend. No. 1, National Standard of Canada.  
.2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.  
.3 Canadian Standards Association (CSA International)  
.1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 DELIVERY, STORAGE AND HANDLING .1 Waste Management and Disposal:  
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Construction/Demolition Waste Management and Disposal.

1.4 MEASUREMENT PROCEDURES .1 Included in balance of project.

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PART 2 - PRODUCTS

- |                      |    |   |
|----------------------|----|---|
| <u>2.1 MATERIALS</u> | .1 | Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.       |
|                      | .2 | Granular base: Granular A material as per Section 32 11 23 - Aggregate Base Courses requirements. |
|                      | .3 | Kerosene: to CAN/CGSB-3.3.  |

PART 3 - EXECUTION

- |                                  |    |  |
|----------------------------------|----|--|
| <u>3.1 GRADE<br/>PREPARATION</u> | .1 | Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.              |
|                                  | .2 | Construct embankments using excavated material free from organic matter or other objectionable materials.              |
|                                  | .3 | When constructing embankment provide for minimum 0.6 m shoulders, where applicable, outside of neat lines of concrete. |
|                                  | .4 | Place fill in maximum 150 mm layers and compact to at least 95 % of maximum dry density to ASTM D 698.                 |
| <u>3.2 GRANULAR BASE</u>         | .1 | Obtain Departmental Representative's approval of subgrade before placing granular base.                                |
|                                  | .2 | Place granular base material to lines, widths, and depths as indicated.  |
|                                  | .3 | Compact granular base in maximum 150 mm layers to at least 95 % of maximum density to ASTM D 698.                      |
| <u>3.3 CONCRETE</u>              | .1 | Obtain Departmental Representative's approval of granular base prior to placing concrete.                              |
|                                  | .2 | Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.   |
-

3.3 CONCRETE  
(Cont'd)

- .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .4 Provide edging as indicated with 10 mm radius edging tool.
- .5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Engineer can be demonstrated. Hand finish surfaces when directed by Departmental Representative.

3.4 TOLERANCES

- .1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.5 EXPANSION AND  
CONTRACTION JOINTS

- .1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5 m.
- .2 Install expansion joints at intervals of 6 m.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6 ISOLATION  
JOINTS

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Seal isolation joints with sealant approved by Departmental Representative.

3.7 CURING

- .1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound as directed by Departmental Representative.

3.7 CURING  
(Cont'd)

- .2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
- .3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.8 BACKFILL

- .1 Allow concrete to cure for 7 days prior to backfilling.
- .2 Backfill to designated elevations with material as directed by Departmental Representative.
  - .1 Compact and shape to required contours as indicated.

3.9 CLEANING

- .1 Proceed in accordance with Section 01 74 19 - Project Waste Management.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

- 1.1 SECTION INCLUDE .1 Materials and installation for temporary chain link fences and gates.
- 1.2 REFERENCES .1 American Society for Testing and Materials International, (ASTM).  
.1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.  
.2 ASTM A90/A90M-09, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.  
.3 ASTM A121-07, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.  
.4 ASTM A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)  
.1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.  
.2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.  
.3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.  
.4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.  
.5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International).  
.1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.  
.2 CAN/CSA-A3000-08, Cementitious Materials Compendium.
- .4 Department of Justice Canada (Jus). Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).  
.1 Material Safety Data Sheets (MSDS).
-

1.2 REFERENCES  
(Cont'd)

- .6 The Master Painters Institute (MPI) -  
Architectural Painting Specification Manual -  
2003.
  - .1 MPI # 18, Organic Zinc Rich Primer.
- .7 Transport Canada (TC).
  - .1 Transportation of Dangerous Goods Act (TDGA),  
1992, c. 34.

1.3 HEALTH AND  
SAFETY

- .1 Do construction occupational health and safety in  
accordance with Section 01 35 29 - Health and  
Safety Requirements.

1.4 MEASUREMENT  
PROCEDURES

- .1 Included in balance of project.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 1.8m high portable chain-link fence OPSD 972.131  
and 3m wide single swing lockable gate OPSD  
972.102.

PART 3 - EXECUTION

3.1 GRADING

- .1 Remove debris and correct ground undulations along  
fence line to obtain smooth uniform gradient  
between posts.

3.2 ERECTION OF  
FENCE

- .1 Erect fence along lines as indicated on Contract  
Drawings or directed by Departmental  
Representative.

3.3 INSTALLATION OF  
GATES

- .1 Install gates in locations as indicated on  
Contract Drawings or as directed by Departmental  
Representative.
- .2 Level ground between gate posts and set gate  
bottom approximately 40 mm above ground surface.

PART 1 - GENERAL

- |  |    |  |
|--|----|--|
| <u>1.1 RELATED<br/>SECTIONS</u>                        | .1 | 31 23 33.01 - Excavation, Trenching and Backfilling.   |
| <u>1.2 REFERENCES</u>                                  | .1 | Agriculture and Agri-Food Canada<br>.1 The Canadian System of Soil Classification, Third Edition, 1998.                          |
|  | .2 | Canadian Council of Ministers of the Environment<br>.1 PN1340-2005, Guidelines for Compost Quality.                              |
|  | .3 | .1 OPSS 2501<br>.1 OPSS 802  |
| <u>1.3 MEASUREMENT AND<br/>PAYMENT PROCEDURES</u>      | .1 | Measure topsoil included in work in cubic meters (m <sup>2</sup> ). All additional work is to be included in balance of project. |
| <u>1.4 WASTE<br/>MANAGEMENT AND<br/>Waste DISPOSAL</u> | .1 | Separate waste materials for reuse and recycling in accordance with Section 01 74 20.  |

PART 2 - PRODUCTS

- |                            |    |   |
|----------------------------|----|---|
| <u>2.1 TOPSOIL</u>         | .1 | Topsoil for sodded areas as per OPSS 802.   |
|                            | .2 | All topsoil will be screened prior to placement. Topsoil will pass through a 25mm screen.   |
| <u>2.2 SOIL AMENDMENTS</u> | .1 | Fertilizer:<br>.1 Fertility: major soil nutrients present in following amounts:<br>.2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.<br>.3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.<br>.4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil. |
-

2.2 SOIL AMENDMENTS  
(Cont'd)

- .1 (Cont'd)
  - .5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
  - .6 Ph value: 6.5 to 8.0.
- .2 Sand: washed coarse silica sand, medium to course textured.
- .3 Organic matter: compost in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.
- .4 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.
- .5 Limestone:
  - .1 Ground agricultural limestone.
- .6 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

2.3 SOURCE QUALITY  
CONTROL

- .1 Advise Department Representative of sources of topsoil to be utilized with sufficient lead time for testing.

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 sediment and erosion control plan.
- .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.

3.2 STRIPPING OF  
TOPSOIL

- .1 Begin topsoil stripping of areas after area has been cleared of brush weeds and grasses and removed from site.
- .2 When stripping topsoil, avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
- .3 Protect stockpiles from contamination and compaction.

3.3 PREPARATION OF  
EXISTING GRADE

- .1 Verify that grades are correct.
  - .1 If discrepancies occur, notify Department Representative and do not commence work until instructed by Department Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials.
  - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
  - .2 Remove debris which protrudes more than 75 mm above surface.
  - .3 Dispose of removed material off site.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.4 PLACING AND  
SPREADING OF  
TOPSOIL/PLANTING  
SOIL

- .1 Place topsoil after Department Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.5 FINISH GRADING

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.



- |  |    |  |
|--|----|--|
| <u>3.5 FINISH GRADING<br/>(Cont'd)</u> | .1 | (Cont'd)<br>.1 Prepare loose friable bed by means of<br>cultivation and subsequent raking.   |
|  | .2 | Consolidate topsoil to required bulk density using<br>equipment approved by a Department Representative.<br>.1 Leave surfaces smooth, uniform and firm<br>against deep footprinting. |
| <u>3.6 ACCEPTANCE</u>                  | .1 | Department Representative will inspect and test<br>topsoil in place and determine acceptance of<br>material, depth of topsoil and finish grading.                                    |
| <u>3.7 SURPLUS<br/>MATERIAL</u>        | .1 | Dispose of surplus material off site.  |
| <u>3.8 CLEANING</u>                    | .1 | Proceed in accordance with Section 01 74 20.   |
|  | .2 | Upon completion of installation, remove surplus<br>materials, rubbish, tools and equipment barriers.   |

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 32 91 19.13 - Topsoil Placement and Grading.
- 1.2 SUBMITTALS
- .1 Product Data.
    - .1 Submit product data in accordance with Section 01 33 00.
    - .2 Provide product data for:
      - .1 Seed.
      - .2 Mulch.
      - .3 Tackifier.
      - .4 Fertilizer.
- 1.3 SCHEDULING
- .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
- 1.4 MEASUREMENT AND PAYMENT PROCEDURES
- .1 Measure hydraulic seeding included in work in square meters (m<sup>2</sup>). All additional work is to be included in balance of the project.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
    - .1 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
  - .2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:
    - .1 Type II mulch:
      - .1 Made from newsprint, raw cotton fibre and straw, processed to produce fibre lengths of 15 mm minimum and 25 mm maximum. Greater proportions of ingredients to be straw.

- |                                  |   |
|----------------------------------|---|
| <u>2.1 MATERIALS</u><br>(Cont'd) | .2 (Cont'd)<br>.1 (Cont'd)<br>.3 Tackifier: water dilutable, liquid dispersion.<br>.4 Water: free of impurities that would inhibit germination and growth.<br>.5 Fertilizer:<br>.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".<br>.2 Commercial Grade (10-10-10) |
|----------------------------------|---|

PART 3 - EXECUTION

- |                                    |   |
|------------------------------------|---|
| <u>3.1 WORKMANSHIP</u>             | .1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.<br>.2 Clean-up immediately, any material sprayed where not intended, to satisfaction of Departmental Representative.<br>.3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.<br>.4 Protect seeded areas from trespass until plants are established. |
| <u>3.2 PREPARATION OF SURFACES</u> | .1 Preparation of soil as per Section 32 91 19.13.  |
| <u>3.3 SLURRY APPLICATION</u>      | .1 Hydraulic seeding equipment:<br>.1 Slurry tank.<br>.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.<br>.2 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.<br>.1 Using correct nozzle for application.<br>.2 Using hoses for surfaces difficult to reach and to control application.  |

3.3 SLURRY  
APPLICATION  
(Cont'd)

- .3 Blend application 500 mm into adjacent grass areas or sodded areas and previous applications to form uniform surfaces.
- .4 Re-apply where application is not uniform.
- .5 Remove slurry from items and areas not designated to be sprayed.
- .6 Protect seeded areas from trespass.
- .7 Remove protection devices as directed by Departmental Representative.

3.4 MAINTENANCE  
DURING  
ESTABLISHMENT  
PERIOD

- .1 Perform following operations from time of seed application until acceptance by Departmental Representative.
- .2 Grass Mixture:
  - .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
  - .2 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
  - .3 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

3.5 ACCEPTANCE

- .1 Seeded areas will be accepted by Departmental Representative provided that:
  - .1 Plants are uniformly established. Seeded areas are free of rutted, eroded, bare or dead spots.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.6 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

- |  |    |  |
|--|----|--|
| <u>1.1 RELATED<br/>SECTIONS</u>                  | .1 | Section 01 74 20 - Construction/Demolition Waste Management and Disposal.  |
|  | .2 | Section 32 91 19.13 - Topsoil Placement and Grading.   |
| <u>1.2 SCHEDULING</u>                            | .1 | Schedule sod laying to coincide with preparation of soil surface. Sod to be applied immediately after topsoil surface is ready and accepted. |
|  | .2 | Schedule sod installation when frost is not present in ground.   |
| <u>1.3 MEASUREMENT<br/>PROCEDURES</u>            | .1 | Included in Balance of Project.  |
| <u>1.4 WASTE<br/>MANAGEMENT AND<br/>DISPOSAL</u> | .1 | Separate and recycle waste materials in accordance with Section 01 74 20 - Construction/Demolition Waste Management and Disposal.            |

PART 2 - PRODUCTS

- |                      |    |   |
|----------------------|----|---|
| <u>2.1 MATERIALS</u> | .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:<br>.1 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. |
|                      | .2 | Turf Grass Nursery Sod quality:<br>.1 Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.<br>.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.   |
-

2.1 MATERIALS  
(Cont'd)

- .1 (Cont'd)
- .2 (Cont'd)
  - .3 Mowing height limit: 35 to 65 mm.
  - .4 Soil portion of sod: 6 to 15 mm in thickness.
- .2 Water:
  - .1 Supplied by contractor via off-site source.
- .3 Fertilizer:
  - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
  - .2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY  
CONTROL

- .1 Obtain approval from Departmental Representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization from. Departmental Representative.

PART 3 - EXECUTION

3.1 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 Departmental Representative and do not commence work until instructed by Department 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 tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod, 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.

3.2 SOD PLACEMENT

- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .2 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.
- .3 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.3 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. Departmental Representative.
  - .4 Drive pegs to 20 mm above soil surface of sod sections.

3.4 MAINTENANCE  
DURING  
ESTABLISHMENT  
PERIOD

- .1 Perform following operations from time of installation until acceptance.
- .2 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
- .3 Cut grass to 50 mm when or prior to it reaching height of 75 mm. Remove clippings which will smother grassed areas as directed by Departmental Representative.
- .4 Maintain sodded areas weed free 95%.
- .5 Fertilize areas. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

3.5 ACCEPTANCE

- .1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative 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.
- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.6 MAINTENANCE  
DURING WARRANTY  
PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period:
- .2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.
- .3 Eliminate weeds by mechanical or chemical means to extent acceptable to Departmental Representative.

3.7 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers. Refer to Section 01 74 20 - Construction/Demolition Waste Management and Disposal.



PART 1 - GENERAL

1.1 Description

- .1 The work covered in this specification shall include the supply of all labour, materials, consumables and equipment necessary to install therequired plant material.
- .2 Supply of and payment for work covered by this section will assume spring and summer planting conditions

1.2 Quality Assurance

- .1 Planting work is to be carried out by experienced personnel under the direction of a skilled foreman.
- .2 Obtain approval form Consultant of plant material source(s) prior to placing orders.
- .3 Canadian Nursery Trades Association Sixth Edition of Canadian Standards for Curserly Stock shall be the minimum standard for plant material unless this specification is superior, in which case thisspecification shall apply.

1.3 Scheduling

- .1 Obtaion approval from Departmental Representative of schedule 7 days in advance of shipment of plant material.
- .2 Schedule to include:
  - .1 Date for selection of plant material representative sample at source by Consultant.
  - .2 Quantity and type of plant material.
  - .3 Shipping dates.
  - .4 Arrival dates on site.
  - .5 Planting dates.

1.4 Product, Delivery, Storage and Handling

- .1 Refer to Contract Drawings for locations and accurate plant lists and quantities of all material
- .2 Supply manufactured items such as fertilizer, bonemeal, mulch, etc., in standard containers, clearly indicating contents, weight, compoent analysis, and the name of the manufacturer.

1.4 Product,  
Delivery, Storage and  
Handling  
(Cont'd)

- .3 Store manufactured materials, subject to deterioration, in a weatherproof place on site and in such a manner that their effectiveness is not impaired.
- .4 Supply plant material as specified on the plant list on each drawing and in accordance with sizes specified. Undersized material will not be accepted in this contract.
- .5 Provide all material, "B & B" (called and burlapped on the plant list, with a solid, earth rootball, wrapped in burlap, bare-root, or potted, as required.
- .6 Do not use plant material on which the rootball has been cracked or broken preparatory to, or during the planting process.
- .7 Provide rootballs of the following minimum sizes to meet the corresponding tree size. Ensure the rootball is large enough to accommodate at least 75% of the fibrous root section.

|                         |                       |
|-------------------------|-----------------------|
| Deciduous Trees Caliper | Minimum Rootball Dia. |
| 45-60mm                 | 70mm                  |
| 70-80mm                 | 90cm                  |
- .8 Wrap rootballs according to the following schedule: Rootball Dia. Wrapping Schedule over 60cm double wrap 142 g hessian burlap and drum laced with 6mm rope at 20cm spacing.
- .9 Cut all roots cleanly when digging plants. Split roots are not acceptable. Cut roots even with the edges of the rootball.
- .10 Protect all plant material from damage and breakage. Protect all parts of the plant material from drying out from the time of digging until they are installed.
- .11 Do not transport plant material in an open truck unless it is adequately protected from sun and wind.
- .12 Carefully tie in all branches before transporting.
- .13 Pad all points of contact between plant material and equipment.

1.4 Product,  
Delivery, Storage  
and Handling  
(Cont'd)

---

- .14 Heel in any plant material that cannot be planted during the current day's operations.
  - .1 Bare rooted stock to be heeled-in and kept moist throughout the planting process.
  - .2 For balled and burlapped root balls, place to protect branches from damage. Maintain moisture level in root zones.
- .15 Keep all roots and rootballs moist prior to planting.

1.5 Job Conditions

- .1 Proceed with planting operations only during suitable weather conditions.

1.6 Substitutions

- .1 Supply and install plant material as specified on the plant list. Substitutions of size, or with other plant material will only be allowed with the written approval of the Departmental Representative.

1.7 Inspections

- .1 Make plant material available for inspection at source by the Departmental Representative.
- .2 Ensure plants are labelled true to species upon arrival at job site.
- .3 Approval of plant material at source will not impare the right of the Departmental Representative to inspect plants upon arrival on the site or during the course of construction and to reject plants which have been damaged, or which in any way, do not conform to the specifications.
- .4 If partial acceptance is desired, give notice to the Departmental Representative in writing.
- .5 Partial acceptance will be given when planting work has been delayed due to circumstances beyond the control of the Contractor or where planting would be in discordance with good horticultural practices and would jeopardize the performance of the work and plants.

1.7 Inspections  
(Cont'd)

- .6 Final inspection of all plant material will be made at the end of the specified guarantee period. All plants must be in a healthy growing condition at the time of this inspection.

1.8 Maintenance

- .1 Maintain all plants and planting areas immediately after installation until thirty (30) calendar days after all project work has been inspected, approved and accepted by the Departmental Representative.
- .2 Maintenance shall include all measure necessary to establish and maintain all plants in a vigorous and healthy growing condition, including, but not limited to:
- .1 Cultivating and weeding of planting pits and tree pits. Use herbicides in accordance with the manufacturer's directions and municipal and provincial regulations. Make good any damage resulting from herbicides used at no extra cost.
- .2 When required and in sufficient quantities to saturate the root system.
- .3 Pruning, including the removal of dead or broken branches, and treatment of pruning wounds with approved dressing. Refer to appropriate section.
- .4 Disease and insect control when required. Use chemical methods in accordance with the manufacturer's directions. Make good any damage at no extra cost.
- .5 Keep all accessories in good condition and properly adjusted. Repair or replace accessories when required at no extra cost.
- .6 Provide adequate winter protection in the form of burlap fence, burlap wrapping or the application of antidessicant or all of the above as required to maintain plant material in healthy growing condition.
- .3 At the time of acceptance, all material must be in a healthy bigerous growing condition. Beds and tree pits must be freshly cultivated and free of weeds, rubbish and debris.

1.9 Guarantee

- .1 Refer to Special Conditions Article SC8 - Warranty Period.

1.9 Guarantee  
(Cont'd)

- .2 All plants shall be inspected at the end of the guarantee period(s). Plants which, at that time, are not in a healthy vigorous growing condition, to the Departmental Representative's approval, shall be replaced at no extra charge.
- .3 Replacements shall be supplied and planted in strict accordance with drawings, plant list, and the specifications and shall be subject to the specified guarantee periods.
- .4 Replacements shall be planted as soon as possible, but during the proper planting season, in accordance with accepted horticultural practice.
- .5 All replacement trees shall be clearly marked in a visible manner.
- .6 Notify Departmental Representative in writing, when replacements are to be planted.
- .7 Replacements required because of vandalism, theft, or other causes beyond the Departmental Representative's control, are not part of this Guarantee.
- .8 All bare-rooted stock and aquatics shall be inspected at the end of the guarantee. A minimum percentage of 75% of plant material shall be in healthy growing condition to the Departmental Representative's approval, or shall be replaced at no extra charge.

PART 2 - PRODUCTS

2.1 Plant Material

- .1 All plant material must be nursery grown and meet the specifications set out in the latest Guide Specifications for Nursery Stock prepared by the Canadian Nursery Trades Association (C.N.T.A) for size, height, spread, grading, quality and method of cultivation.
- .2 Nomenclature of specified plants shall conform to the International Code of Nomenclature of Cultivated Plants and the latest edition of Standardized Plant Names.
- .3 Any plant materials not conforming to above will be designated as collected plants.

2.1 Plant Material  
(Cont'd)

- .4 Plant Material: True to name and type, structurally sound, well branched; healthy and vigorous and free from disease, insect infestations, rodent damage, sun scald, frost cracks, and other abrasions to the bark; and densely foliated with a healthy, well developed root system. Pruning wounds must show vigorous bark on all edges and all parts must show live and green cambium tissue when cut. Bare root material shall exhibit a strong fibrous root system. Seedlings/cuttings to have buds for root and leaf development in evidence.
- .5 All material must conform to the sizes shown on the plant list, except that larger material may be used when approved by the Departmental Representative. Use of larger plants will not increase the contract price. Undersized material will be rejected.
- .6 Plant material sizes must conform to the following standards:
  - .1 Caliper diameter of the trunk measured 150mm above the normal grade around the plant.
  - .2 Height measured from the normal grade around the plant to the top of the main foliage mass.
  - .3 Spread the diameter of the main foliage mass, at its widest point.

2.2 Other Material

- .1 Topsoil
  - .1 As per Section 32 92 13 - Topsoil Placement and Grading.
- .2 Compost:
  - .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
  - .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
  - .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25)(50)), and contain no toxic or growth inhibiting contaminants.
  - .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A)

2.2 Other Material  
(Cont'd)

- .3 Fertilizer: As indicated on drawings.
- .4 Bonemeal: to be finely ground commercial bonemeal with a minimum analysis of 4% nitrogen and 20% phosphoric acid.
- .5 Tree wrap: to be 225g burlap supplied in strips 150mm minimum to 250mm maximum width or heavy, waterproof crepe paper 100mm to 150mm wide.
- .6 Anchor Stakes: as per detail drawings.
- .7 Wire: As per detail drawings.
- .8 Hose: to be two ply, new, black rubber garden hose, as per detail drawings.
- .9 Mulch Material: shall be shredded bark by All Treat or equal, varying from 50 to 75 mm and 5 to 20 mm thick, free of small branches and leaves, as approved by Departmental Representative.
- .10 Water: to be free of toxins and impurities that would inhibit plant growth.
- .11 Anti desiccant: to be a wax like emulsion.
- .12 Plastic Wrap Tree Guards: to be commercially available type.

2.3 Planting Soil  
Mix

- .1 Provide standard planting soil mix as follows; 6 parts good quality topsoil, 2 parts well rotted horse or cow manure, 1 part peat moss, plus 0.58 kilos of bonemeal per cubic metre of soil.

PART 3 - EXECUTION

3.1 Preparation

- .1 Obtain the approval of the Departmental Representative of all planting excavations as outlined or indicated on the drawings.

3.2 Pre Planting  
Operations

- .1 Ensure plant material acceptable to Departmental Representative. Nursery grown and supplied plant material to be supplied and installed only as substitute should existing site material not be available for transplant. Nursery grown shrub material to be installed in those areas designated for shrub transplant material.
- .2 Remove damaged roots and branches from plant material.
- .3 Apply anti desiccant to deciduous trees in leaf in accordance with manufacturer's instructions.
- .4 For individual planting holes and planting beds:
  - .1 Stake out planting location and obtain approval of staking form Departmental Representative prior to excavating.
  - .2 Excavate to depth and width as indicated on detail drawings. For shrub beds, excavate entire area to depth of 600 mm
  - .3 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material off site.
  - .4 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

3.3 Planting

- .1 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball. Do not pull burlap or rope from under root ball.
- .2 For container stock or root balls in non degradable wrapping, remove entire container or wrapping without damaging root ball.
- .3 Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to roads and walkways.
- .4 For trees:
  - .1 Ensure width of all planting pits is to be specified width on the detail drawings.



3.3 Planting  
(Cont'd)

- .4 (Cont'd)
  - .2 Place plant plumb in the centre of the planting pit with a minimum of 200 mm of compacted planting soil mixture under the rootball of trees; and 150 mm of compacted planting soil mixture under the rootball of shrubs. Face the plant to give the best appearance or relationship to proposed pedestrian/vehicular traffic. Cut away any ropes which might girdle the tree.
  - .3 Backfill with planting soil in 150mm layers and firmly tamp each layer to ensure the plant retains its orientation. Ensure no air pockets remain around the roots.
  - .4 Water thoroughly when two thirds of the depth of planting pit has been backfilled; fill remaining space with water. After water has penetrated into soil, backfill to finish grade. Water again when the operation is complete.
  - .5 For trees and shrubs, construct an earth saucer around each plant equal to the diameter of the tree pit to retain water around the roots.
  - .6 Correct soil settlement as it occurs during the guarantee period.
- .5 For other mass plantings:
  - .1 For trees (whips, liners), shrubs, and groundcovers:
    - .1 For trees, excavate to the depth and width as indicated on detail drawings. For shrub and beds, excavate to a minimum of 600mm.
    - .2 Backfill with planting soil in 150mm lifts. Tamp each lift to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.
    - .3 Form watering saucer as indicated on detail drawings.
  - .2 For perennials:
    - .1 Refer to contract drawings for specific notes applicable to perennial planting.
    - .2 Ensure container is removed prior to planting.
    - .3 Plant material with roots placed straight out in hole.
    - .4 If live stake culling installed, tamp plant into soil at angle of minimum 10 degrees.
    - .5 Tamp soil firmly around base of plant

3.3 Planting  
(Cont'd)

.5 (Cont'd)

.3 For aquatics:

- .1 Refer to contract drawings for specific notes applicable to aquatic planting.
- .2 Ensure container is removed prior to planting.
- .3 Aquatics to be installed at depth noted on drawings, as as verified by supplier.
- .4 Install aquatics into pond bottom by inserting planting bar in min. 150mm depth, in order to create planting hole large enough to accommodate root system species.
- .5 Plant material with roots placed straight out and evenly within planting hole.
- .6 Tamp soil firmly around base of plant.
- .4 Water plant material thoroughly.
- .5 After soil settlement has occurred, fill with soil to finish grade.
- .6 Dispose of burlap, wire and container material off site, at no extra cost.
- .7 For aquatics, install at depth noted on drawing and verified by supplier. Lower water level to enable planting. Ensure plant is secure to raising water to normal level.

3.4 Trunk  
Protection

.1

Install trunk protection and tree guards on deciduous trees as indicated prior to installation of tree supports, as indicated on the Drawings.

3.5 Tree Supports

.1

Install tree supports as indicated on the Drawings for deciduous and coniferous trees.

- .1 Place one stake on prevailing wind side and 150 mm from trunk, place the other stake at 180 degrees from first stake.
- .2 Drive stake outside the root ball, minimum 150mm into undisturbed soil beneath roots. Ensure stake is secure, vertical and unsplit.
- .3 Install guying collars of sufficient length to encircle tree plus 50mm space for trunk clearance.
- .4 Thread guying wire through guying collar tube. Twist wire to form collar and secure firmly to stake. Cut off excess wire.

3.6 Mulching

- .1 Ensure soil settlement has been corrected prior to mulching.
- .2 Spread mulch as indicated on detail drawings.

3.7 Clean Up

- .1 At the completion of planting operations, remove all surplus material from the site at no extra cost.
- .2 Make good all damage resulting from planting operations at not extra cost.

3.8 Maintenance  
During  
Establishment  
Period

- .1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.
  - .1 Water all plant material to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.
    - .1 For coniferous plant material, water thoroughly in late fall prior to freeze up to saturate soil around root system.
  - .2 Replace or re-spread damaged, missing or disturbed mulch.
  - .3 For non mulched areas, cultivate as required to keep top layer of soil friable.
  - .4 Apply pesticides in accordance with Federal, Provincial and Municipal regulations as, and when required to control insects, fungus and disease. Obtain product approval from Departmental Representative prior to application.
  - .5 remove dead or broken branches from plant material.
  - .6 Keep trunk protection and guy wires in proper repair and adjustment.
  - .7 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
  - .8 Apply Rodent Protection satisfactory to the Owner and Departmental Representative. Claims may not be made for plants that die as a result of rodent damage.

3.9 Acceptance

- .1 Plant material will be accepted by Departmental Representative 90 days after planting operation is completed, provided that plant material exhibits healthy growing conditions and is free from disease, insects and fungal organisms.
- .2 Plant material installed less than 90 days prior to frost will be accepted in following spring, 30 days after start of growing season provided that acceptance conditions are fulfilled.

3.10 Maintenance  
During Warranty  
Period

- .1 From time of acceptance by Departmental Representative to end of 2 year warranty period, perform following maintenance operations.
  - .1 Water during fall and spring seasons to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
  - .2 Replace or respread damaged, missing or disturbed mulch.
  - .3 Where mulch is in place, remove prior to freeze up and replace in spring after soil thaws and warms up.
  - .4 For non mulched areas, cultivate late fall and early spring to keep top layer of soil friable.
  - .5 Apply pesticides in accordance with Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Departmental Representative prior to application.
  - .6 Apply fertilizer in early spring at manufacturer's suggested rate.
  - .7 Remove dead, broken or hazardous branches from plant material.
  - .8 Keep trunk protection and tree supports in proper repair and adjustment where required for newly planted stock.
  - .9 Remove trunk protection, tree supports and level watering saucers at end of warranty period.
  - .10 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
  - .11 Install burlap wrap or apply antidessicant as required to overwinter plant material.
  - .12 Submit seasonal written reports to Departmental Representative identifying:
    - .1 Maintenance work carried out.

|                  |     |   |
|------------------|-----|---|
| 3.10 Maintenance | .1  | (Cont'd)                                |
| During Warranty  | .12 | (Cont'd)                                |
| Period           | .2  | Development and condition of plant      |
| (Cont'd)         |     | material.                               |
|                  | .3  | Preventative or corrective measures     |
|                  |     | required which are outside Contractor's |
|                  |     | responsibility.                         |

PART 1 - GENERAL

- |   |    |   |
|---|----|---|
| <u>1.1 RELATED SECTIONS</u>                   | .1 | Section 31 23 33.01: Excavating, Trenching and Backfilling.   |
|   | .2 | Section 33 44 01: Storm Sewers.   |
|   | .3 | Section 33 34 02: Sanitary Sewers.  |
| <u>1.2 SOURCE QUALITY CONTROL</u>             | .1 | Departmental Representative will inspect material at construction site.   |
| <u>1.3 MEASUREMENT AND PAYMENT PROCEDURES</u> | .1 | Measure 1200mmØ Storm Maintenance Holes in vertical metres measured from lowest invert to finished grade on frame and cover. All additional work is to be included in the balance of the project.         |
|   | .2 | Measure 1200mmØ Sanitary Maintenance Holes in vertical metres measured from lowest invert to finished grade on the frame and cover. All additional work is to be included in the balance of the project.  |
|   | .3 | Measure 600x1400mm Ditch Inlet included in work in vertical metres measured from lowest invert to finished grade on frame and cover. All Additional work is to be included in the balance of the project. |

PART 2 - PRODUCTS

- |                      |    |  |
|----------------------|----|--|
| <u>2.1 MATERIALS</u> | .1 | Cement: to CAN/CSA-A3001-08, Type GU.  |
|                      | .2 | Water, aggregates, admixtures: to CSA-A23.1-09/A23.2-09, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete. |
|                      | .3 | Frames, gratings, covers: to plan dimensions and to following requirements for designated materials:   |
-

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2.1 MATERIALS  
(Cont'd)

- .3 (Cont'd)
  - .1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.
  - .2 Sanitary maintenance hole frames and covers: cover cast without perforations and complete with two 25 mm square lifting holes to OPSD 401.010 Nov. 2007, Type A.
  - .3 Storm maintenance hole frames and covers: cover cast with perforations and complete with two 25mm lifting hole to OPSD 401.010 Nov.2007 Type B. Frames to be provided with four 25mm holes to accomodate anchor bolts for fastening frame to concrete manhole. Holes to be configured by manufactuer. Fastenings to consist of 4-10mm dia. Stainless Steel adhesive anchors embedded 50mm and laid out as indicated.
  - .4 Catch basin frames and covers: to OPSD 400.020 Nov. 2007. Complete with bolt holes to secure, as indicated.
  - .5 All openings are to be lockabel.
- .4 Precast maintenance holes: to ASTM C478M-09, OPSD 701.011.
- .5 Ladder rungs: to OPSS 1351.
- .6 Mortar:
  - .1 Aggregate: to CSA A179-04(R2009).
  - .2 Cement: to CAN/CSA-A3002-08.
- .7 Adjustment rings: precast concrete to ASTM C478M-09.
- .8 Perforated Drains: For every storm maintenance hole and catchbasin provide two (2) 100mm Ø flexible perforated pipe drains.

PART 3 - EXECUTION

3.1 EXCAVATION AND  
BACKFILL

- .1 Excavation and backfill to Section 31 23 33.01.
- .2 Excavation requires approval prior to installing maintenance holes or catch basins.

3.2 CONCRETE WORK

- .1 Do concrete work to CSA-A23.1-09/A23.2-09.

3.2 CONCRETE WORK  
(Cont'd)

- .2 Position metal inserts to dimensions and details shown or required.

3.3 INSTALLATION

- .1 Construct units to details indicated, plumb and true to alignment and grade.
- .2 Complete maintenance holes as pipe laying progresses. Maximum of 3 maintenance holes behind point of pipe laying will be allowed.
- .3 Pump maintenance hole excavation dry and remove soft and foreign material before placing concrete base.
- .4 Set precast concrete slab on 300mm minimum of well compacted granular A material.
- .5 Set bottom section of precast unit in place. Make each successive joint watertight with approved rubber ring gaskets, mastic joint filler, cement mortar, or combination thereof.
- .6 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
- .7 Plug lifting holes with precast concrete plugs set in cement mortar or compound.
- .8 For sanitary sewers:  
.1 Place stub outlets and bulkheads at elevations and in positions indicated.  
.2 Bench to provide a smooth U-shaped channel. Side height of channel to be half diameter of sewer. Adjacent floor to be sloped at 75 mm/m. Channels to be curved smoothly. Slope invert to establish sewer grade. For pipes smaller than 150 use standard fittings, breaking out upper half of fitting upon completion of maintenance hole.
- .9 Ensure top risers are parged with hydraulic cement to stop infiltration.
- .10 Installing units in existing systems:  
.1 Where new unit is within existing run of pipe, carefully remove existing pipe to dimensions required and install new unit as specified.  
.2 Make joints watertight between new unit and existing pipe.



3.3 INSTALLATION  
(Cont'd)

- .10 (Cont'd)
  - .3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready to be put into operation, complete the installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or any other necessary work.
- .11 Set frame and cover to required elevation, parge and make smooth and watertight.
- .12 All manhole and catch basin security components will need to be verified and replaced when deemed defective following the Departmental Representative's review and approval.
- .13 Place frame and cover on top section to elevation indicated. If adjustment required use concrete ring.
- .14 Clean units of debris and foreign materials; remove fins or sharp protuberances.

3.4 ADJUSTING TOPS  
EXISTING UNITS

- .1 Remove existing gratings, and frames, and store for re-use at locations designated by Departmental Representative.
- .2 Sectional units:
  - .1 Raise or lower straight walled sectional units by adding or removing precast sections as required.
  - .2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation, then replace cone section.
- .3 Monolithic units:
  - .1 Raise monolithic units by roughening existing top to ensure proper bond and extend to required elevation with:
    - .1 Mortared brick course for 150 mm or less alteration.
    - .2 Cast-in-place concrete.
  - .2 Lower monolithic units with straight wall by removing concrete to elevation indicated for rebuilding.

3.4 ADJUSTING TOPS  
EXISTING UNITS  
(Cont'd)

- .3 (Cont'd)
- .3 When monolithic units with tapered upper section are to be lowered more than 150 mm remove concrete for entire depth of taper plus as much straight wall as necessary, then rebuild upper section to required elevation with cast-in-place concrete.
- .4 Install additional maintenance hole ladder rungs in adjusted portion of units as required.
- .5 Re-use existing gratings, frames.
- .6 Re-set gratings and frames to required elevation on full bed of cement mortar, parge and trowel smooth.

3.5 SEALING OVER  
EXISTING UNITS

- .1 Cut galvanized iron sheet to extend 50 mm beyond opening of existing maintenance hole or catch basin grating. Center iron sheet over existing grating and spot or stitchweld to grating.

PART 1 - GENERAL

- |                             |    |   |
|-----------------------------|----|---|
| <u>1.1 SECTION INCLUDES</u> | .1 | Materials and installation for water mains, hydrants, valves, valve boxes, and valve chambers, including service connections.   |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 31 23 33.01 - Excavating, Trenching and Backfilling.  |
| <u>1.3 REFERENCES</u>       | .1 | American Water Works Association AWWA<br>.1 AWWA B300-04, Hypochlorites.<br>.2 AWWA B301-04, Liquid Chlorine.<br>.3 AWWA B303-05, Sodium Chlorite.<br>.4 AWWA C104/A21.4-03, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.<br>.5 AWWA C111/A21.11-00, Rubber-Gasket Joints for Ductile-Iron and Gray Iron Pressure Pipe and Fittings.<br>.6 AWWA C110/A21.10-03, Ductile-Iron and Gray Iron Fittings.<br>.7 AWWA C153/A21.53-00, Ductile-Iron Compact Fittings for Water Service.<br>.8 AWWA C200-97, Steel Water Pipe 6 in. (150 mm) and Larger.<br>.9 AWWA C205-00, Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 Inch (100 mm) and Larger - Shop Applied.<br>.10 AWWA C206-03, 2005 edition, Field Welding of Steel Water Pipe.<br>.11 AWWA C207-01, Steel Pipe Flanges for Waterworks Service, Sizes 4 Inch through 144 Inch (100 mm through 3,600 mm).<br>.12 AWWA C208-01, Dimensions for Fabricated Steel Water Pipe Fittings.<br>.13 AWWA C300-97, Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.<br>.14 AWWA C500-02, Metal-Seated Gate Valves for Water Supply Service (Includes Addendum C500a-95).<br>.15 AWWA C504-00, Rubber-Seated Butterfly Valves.<br>.16 AWWA C600-05, Installation of Ductile-Iron Water Mains and Their Appurtenances.<br>.17 AWWA C602-00, Cement-Mortar Lining of Water Pipelines in place - 4 In. (100 mm) and Larger.<br>.18 AWWA C651-99, Disinfecting Water Mains. |

1.3 REFERENCES  
(Cont'd)

- .1 (Cont'd)
  - .19 AWWA C800-05, Underground Service Line Valves and Fittings (Also Included: Collected Standards for Service Line Materials).
  - .20 AWWA C900-97, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 12 Inch (100 mm - 300 mm), for Water Distribution.
- .2 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
  - .2 ASTM A307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - .3 ASTM C117-04, Standard Test Method for Material Finer Than 75 MU m (No. 200) Sieve in Mineral Aggregates by Washing.
  - .4 ASTM C478M-08e1, Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric).
  - .5 ASTM F714-08, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- .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.
  - .3 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
  - .4 CGSB 41-GP-25M-77, Pipe, Polyethylene, for the Transport of Liquids.
- .4 Canadian Standards Association (CSA International)
  - .1 CSA B137 Series-02, 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 CSA B137.1-02, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
    - .2 CSA B137.3-02, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
- .5 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).

### 1.3 REFERENCES (Cont'd)

- .6 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .7 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - March 1998(R2002).
- .8 Ontario Provincial Standard Specification (OPSS) and Ontario Provincial Standard Drawings (OPSD)
  - .1 OPSS 441, November 2010 (typical for all references to OPSS 701), Construction Specification for Watermain Installation in Open Cut.
  - .2 OPSS 442 (typical for all references to OPSS 702), November 2010, Construction Specification for Corrosion Protection of New and Existing Watermains.

### 1.4 MEASUREMENT PROCEDURES

- .4 All material and work of this section shall fall under the lump sum arrangement.

### 1.5 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Submit complete shop drawings and construction schedule for water mains. Include method for installation of water main.
- .3 Inform Departmental Representative of proposed source of bedding materials and provide access for sampling at least 4 weeks prior to commencing work.
- .4 Submit Hydrostatic and leak test procedure identifying location of blow-offs and pressure gauge location 2 weeks prior to commencement.
- .5 Submit a flushing and disinfection plan 2 weeks prior to commencement.
- .6 Submit manufacturer's test data and certification that pipe materials meet requirements of this section at least 4 weeks prior to beginning work. Include manufacturer's drawings, information and shop drawings where pertinent.
- .7 Pipe certification to be on pipe.

1.6 CLOSEOUT  
SUBMITTALS

- .1 Provide 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, maintenance and operating instructions.
  - .1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants.

1.7 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.
- .3 Separate for reuse and recycling and place in designated containers waste in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Ensure emptied containers are sealed and stored safely.
- .7 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .8 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.
- .9 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
- .10 Dispose of unused disinfection material at official hazardous material collections site approved by Departmental Representative.

1.7 WASTE  
MANAGEMENT AND  
DISPOSAL  
(Cont'd)

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- .11 Do not dispose of unused disinfection material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.
- .12 Fold up metal banding, flatten and place in designated area for recycling.

1.8 SCHEDULING OF  
WORK

---

- .1 Schedule Work to minimize interruptions to existing services. Maximum interruption time of 6 hours will be permitted.
- .2 Submit schedule of expected interruptions to Departmental Representative for approval and adhere to interruption schedule as approved by Departmental Representative.
- .3 Notify Departmental Representative minimum of 48 h in advance of interruption in service.
- .4 Do not interrupt water service for more than 6 h and confine this period between 10:00 and 16:00 h local time unless otherwise authorized.
- .5 Notify fire department of any planned or accidental interruption of water supply to hydrants.
- .6 Provide "Out of Service" sign on hydrant not in use.

PART 2 - PRODUCTS

2.1 PIPE, JOINTS  
AND FITTINGS

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- .1 Polyvinyl chloride pressure pipe (PVC): to ANSI/AWWA C900, pressure class 150, DR18, Mpa gasket bell end.
  - .1 CSA-B137.3, PVC Series 160, 1.1 MPa elastomeric gasket coupling.
  - .2 Joints shall be a gasket fitted to the bell groove. The pipe and or fittings shall be joined by push fitting bell and spigot joint to the depth indicated on pipe.

.1 Copper tubing: to ASTM B88M type K, annealed.



2.3 SERVICE  
CONNECTIONS  
(Cont'd)

- |  |     |  |
|--|-----|--|
|  | .2  | Polyvinyl chloride pressure pipe: to CSA-B137.3,type 1120 series 160 1.1 MPa.  |
|  | .3  | Polyethylene pressure pipe: To CSA B17.1, typ PE, Series 160 1.1 MPa working pressure.   |
|  | .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  | Brass inverted key-type curb stops: red brass to ASTM B62, compression type without drains.<br>.1 curb stops to have adjustable cast iron service box with stem to suit depth of bury.<br>.2 top of cast iron box marked "WATER/EAU"                       |
|  | .8  | Polyethylene tapping tees or multi-saddle tees: for Polyethylene pipe. Tees to be socket fused to pipe.  |
|  | .9  | Service Connections for PVC pipe: Corporation stop, tapped to main using AWWA threads, complete with stainless steel saddle to consist of circumferential band type complete with side bars and fingers keeper bar, stud bolts, nuts, washers and gaskets. |
|  | .10 | Bronze type service clamps: for PVC pipe service connections:Service Connections for PVC<br>.1 service clamps to be of strap-type, with conined "o" ring seal cemented in place.<br>.2 amps to be tapped with thread to ANSI/AWWA C800.                    |
|  | .11 | Tee connections: for services above NPS 1: Tee connections to be fabricated of same material and to same standard as specified pipe fittings and to have ends matching pipe to which thy are joined.   |

2.4 CORROSION  
PROTECTION

- .1 Cathodic protection must be to the OPSS 442 and OPSD 1109 Standard.
- .2 Anodes to be labelled as follows: "X-XX-XX ANODE".

2.5 TRACING WIRE

- .1 Tracing wire to be TWU or RWU, 10 gauge, 7 strands or more, copper, 60°C or higher, 600V, plastic coated or approved equivalent.
- .2 C-Tap to be approved by CSA and to be sized to connect two tracing wires as specified above.
- .3 Tapes to be rugged, pressure-sensitive, PVC-based, minimum .25mm thickness. Tapes must protect against water, salts and sewage and be suitable for direct burial applications.

2.6 PIPE BEDDING  
AND SURROUND  
MATERIAL

- .1 Granular material to: Granular 'A' as per OPSS 1010.

2.7 BACKFILL  
MATERIAL

- .1 In accordance with Section 31 23 10.

2.8 PIPE  
DISINFECTION

- .1 Contractor to proceed with disinfection only after written approval that disinfection plan has been approved by Departmental Representative.
- .2 Sodium hypochlorite or Calcium hypochlorite in powder form or Liquid chlorine to disinfect water mains.
- .3 Undertake disinfection of water mains in accordance with OPSS 441.
- .4 Contractor is responsible for all sampling/testing costs.

- 2.9 INSULATION .1 Type VI extruded polystyrene foam insulation boards (50mm thick) with a minimum compressive strength of 275 kPa, minimum RSI value of 1.76. 50mm thick insulation boards installed as per manufacturer's specification.
- 2.10 FIRE HYDRANT .1 Hydrants shall be chrome yellow.
- .2 Hydrant shall have 150mm barrel and be equipped with two (2) 63mm outlet nozzles and one 100mm Storz Pumper (Streamer) Port connection and shall be clockwise opening.
- .3 Resilient Seated Gate valves shall be supplied.
- .4 Corrosion Protection:
- .1 Z-12-24 and Z-24-48 zinc anodes. 10.8kg zinc anode on hydrant and 5.4kg zinc anode on fittings and valves.

PART 3 - EXECUTION

- 3.1 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.
- .2 Remove defective materials from site as directed by Departmental Representative.
- .3 Swab all pipes and fittings with liquid chlorine prior to installation.

- 3.2 TRENCHING .1 Do trenching work in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.
- .2 Trench depth to provide cover over pipe of not less than 1.5 m from finished grade or as indicated.

- 3.3 GRANULAR BEDDING .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
-

3.3 GRANULAR  
BEDDING

(Cont'd)

- .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 at least 95% SPD

3.4 PIPE  
INSTALLATION

- .1 Connect new building water service to existing services 1.0m outside building footprint as indicated on the detail drawings.
- .2 Lay pipes to manufacturer's standard instructions and specifications. Do not use blocks except as specified.
- .3 Join pipes in accordance with manufacturer's recommendations.
- .4 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .5 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.
- .6 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
- .7 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.
- .8 Position and join pipes with equipment and methods approved by Departmental Representative.
- .9 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.
- .10 Align pipes before jointing.

3.4 PIPE  
INSTALLATION  
(Cont'd)

- .11 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.
- .12 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.
- .13 Complete each joint before laying next length of pipe.
- .14 Minimize deflection after joint has been made.
- .15 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
- .16 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes.
- .17 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
- .18 Do not lay pipe on frozen bedding.
- .19 Do hydrostatic test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material.
- .20 Backfill remainder of trench.
- .21 Do not connect any new watermain to an existing watermain without consent of Departmental Representative.

3.5 VALVE  
INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes by means of concrete located between valve and solid ground. Valves not to be supported by pipe.

3.6 THRUST BLOCKS  
AND RESTRAINED  
JOINTS

- .1 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as indicated.
- .2 Keep joints and couplings free of concrete.
- .3 For restrained joints: only use restrained joints approved by Departmental Representative.

3.7 CORROSION  
PROTECTION

- .1 Cathodic protection shall be installed to the current standard of the OPSD.
- .2 Spacing of anodes shall be:
  - .1 100-300mmØ DI fittings/valves-Z-12-24 @ 1 per each.

3.8 TRACER WIRE

- .1 Tracer wire shall be installed as per OPSS standards and shall be connected on all PVC/HDPE pipe, fittings, etc. to form a continuous loop.
- .2 Test the loop of tracer wire and demonstrate to Departmental Representative that it functions properly after the backfill has been completed.

3.9 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 Departmental Representative at least 48 hours in advance of proposed tests.
    - .1 Perform tests in presence of Departmental Representative.
  - .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 Open valves.
  - .6 Expel air from main by slowly filling main with potable water from source and method approved by Departmental Representative.
-

3.9 HYDROSTATIC  
AND LEAKAGE TESTING  
(Cont'd)

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- .7 Thoroughly examine exposed parts and correct for leakage as necessary.
- .8 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.
- .9 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
- .10 Repeat hydrostatic test until defects have been corrected and leakage amount has been deemed acceptable in the opinion of the Departmental Representative.

3.10 PIPE SURROUND

- .1 Upon completion of pipe laying and after Departmental Representative 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 underside of backfill to 100% SPD.
- .6 If cover of 1.5m is not maintained, insulation must be used.

3.11 BACKFILL

- .1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Compact Backfill to 100% SPD.

3.12 FLUSHING AND  
DISINFECTING

- .1 Contractor to supply hauled water for flushing and disinfecting.
  - .2 Flushing and disinfecting operations: witnessed by Departmental Representative carried out by Contractor.
-

3.12 FLUSHING AND  
DISINFECTING  
(Cont'd)

- .2 (Cont'd)
- .1 Notify Departmental Representative at least 4 days in advance of proposed date when disinfecting operations will begin.
- .3 All chlorinated water discharged to the natural environment shall be dechlorinated prior to release.
- .4 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.
- .5 Provide connections and pumps for flushing as required.
- .6 Open and close valves, hydrants and service connections to ensure thorough flushing.
- .7 At a point no more than 3m downstream of the beginning of the watermain, water entering the watermain shall receive a dose of chlorine fed at a constant rate such that the water will not have less than 25mg/L and not more than 80 mg/L of free chlorine. To ensure that this concentration is adequate, take samples at regular intervals. Samples to be tested by a certified lab to ensure chlorine levels. Measure the chlorine concentration at regular intervals.
- .8 Allow chlorinated water to stay in watermain for a period of 24 hours. After the 24 hour retention period, a sample is to be tested by a certified laboratory to indicate the level of chlorine. Flush the chlorinated water from the watermain. Continue flushing the watermain until the chlorine residual of the discharge water matches that of the source water. A sample is to be tested by a certified lab to indicate the chlorine level matches the source water.



- |   |     |  |
|---|-----|--|
| 3.12 FLUSHING AND<br>DISINFECTING<br>(Cont'd) | .9  | After final flushing, and prior to connecting the new watermain to the distribution system, the contractor shall advise the operating authority who will collect two consecutive sets of acceptable samples, taken at least 24 hours apart shall be collected from the main. At least one set of samples shall be collected from every 360m of the new watermain, plus one set from the end of the line and at least one set from each branch. All samples shall be tested in accordance with Standard Methods for the examination of water and wastewater for E.Coli, total coliforms, and HPC. |
|   | .10 | Watermain disinfection laboratory tests to be paid by the Contractor.  |
| 3.13 SURFACE<br>RESTORATION                   | .1  | After installing and backfilling over water mains, restore surface to original condition as indicated and as directed by Departmental Representative.  |
| 3.14 AS-BUILT<br>DRAWINGS                     | .1  | Contractor shall supply to the Departmental Representative an "as-built" drawing indicating the horizontal and vertical alignment of the watermain and appurtenances. All anodes, valves, bends, hydrants tees, changes in material, etc. shall be noted.  |
| 3.15 FIRE HYDRANT<br>INSTALLATION             | .1  | To be as per OPSD 1105.010 and manufacturer's directions.  |
|   | .2  | Pipes and valves to be installed as specified in this section.   |

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 33 05 14: Maintenance holes and catch basins.

1.2 MATERIAL  
CERTIFICATION

- .1 Contractor shall verify pipe diameter, pipe outside dimension and pipe type prior to ordering new material for installation.
- .2 At least 2 weeks prior to commencing work submit manufacturer's test data and certification that pipe materials meet requirements of this section.

1.3 AS BUILT  
DRAWINGS, OPERATING  
AND MAINTENANCE  
DATA

- .1 Provide as built drawings of sewers upon project completion. Give details of pipe material, location of cleanouts, directions and list of equipment to operate valves, other maintenance and operating instructions.

1.4 SCHEDULING OF  
WORK

- .1 Schedule work to minimize interruptions to existing services.
- .2 Maintain existing sewage flows during construction and provide pumping as required.
- .3 Submit schedule of expected interruptions for approval and adhere to approved schedule.

1.5 MEASUREMENT AND  
PAYMENT PROCEDURES

- .1 Measurement for the Sanitary Sewer Pipe included in work in linear meters. All additional work is to be included in balance of project.

PART 2 - PRODUCTS

2.1 PLASTIC PIPE

- .1 Gravity sewer pipe and fittings: Type PSM Poly (Vinyl Chloride): to ASTM D3034-08.
  - .1 Standard Dimension Ratio (SDR): 28.
  - .2 Locked-in gasket and integral bell system.

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- |                                      |    |                       |
|--------------------------------------|----|-----------------------|
| <u>2.1 PLASTIC PIPE<br/>(Cont'd)</u> | .1 | (Cont'd)              |
|                                      | .3 | Nominal lengths: 4 m. |
- 
- |                                       |    |   |
|---------------------------------------|----|---|
| <u>2.2 PIPE BEDDING<br/>MATERIALS</u> | .1 | Granular material to following requirements:<br>.1 Crushed or screened stone, gravel or sand<br>free from clay lumps, cementation, organic<br>material, frozen material and other deleterious<br>materials.<br>.2 Granular 'A': to OPSS 1010. |
|                                       | .2 | Concrete required for thrust blocks to be 20 MPa.   |
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- |                       |    |  |
|-----------------------|----|--|
| <u>2.3 INSULATION</u> | .1 | HI-40 DOW rigid insulation, or approved<br>equivalent, 50mm thick insulation boards installed<br>as per manufacturer's specifications. |
|-----------------------|----|--|
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- |                    |    |  |
|--------------------|----|--|
| <u>2.4 COUPLER</u> | .1 | An appropriate size pipe coupler will be utilized<br>to connect existing pipe to new pipe. |
|--------------------|----|--|
- 
- PART 3 - EXECUTION
- 
- |                        |    |   |
|------------------------|----|---|
| <u>3.1 PREPARATION</u> | .1 | Clean pipes and fittings of debris and water<br>before installation. Inspect materials for defects<br>before installing. Remove defective materials from<br>site. |
|------------------------|----|---|
- 
- |                                       |    |  |
|---------------------------------------|----|--|
| <u>3.2 TRENCHING AND<br/>BACKFILL</u> | .1 | Carry out trenching work as required to install<br>sewers to lines and grades indicated. |
|                                       | .2 | Do not allow contents of any sewer or sewer<br>connection to flow into trench.           |
|                                       | .3 | Trench line require approval prior to placing<br>bedding material and pipe.              |
-

3.2 TRENCHING AND  
BACKFILL  
(Cont'd)

- .4 Do not backfill trenches between joints until pipe grade and alignment have been checked and accepted by Departmental Representative. Do not backfill at joints until pressure and leakage test results are within limits specified unless otherwise approved by Departmental Representative. Protect pipe from freezing if tested at temperatures lower than 5°C.
- .5 Remove excess excavated material from the site.
- .6 If cover of 1.5m is not maintained, insulation must be used.

3.3 INSTALLATION

- .1 Place 150 mm granular bedding materials under piping.
- .2 Shape bed true to grade and to provide continuous, uniform bearing surface for barrel of pipe. Do not use blocks when bedding pipe.
- .3 Shape transverse depressions as required to receive bell if bell and spigot pipe is used.
- .4 Compact full width of bed to at least 95% Standard Proctor density.
- .5 Lay and join pipes in accordance with manufacturer's recommendations.
- .6 Handle pipe carefully with equipment recommended by manufacturer.
- .7 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .8 Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .9 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .10 Do not allow water to flow through pipe during construction, except as may be permitted by Departmental Representative.
- .11 Whenever work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

3.3 INSTALLATION  
(Cont'd)

- .12 Position and join pipes by approved methods. Do not use excavating equipment to force pipe sections together.
- .13 Install PVC pipe and fittings in accordance with CAN/CSA-B1800 Series-06.
- .14 Pipe jointing:
  - .1 Install gaskets in accordance with manufacturer's recommendations.
  - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
  - .3 Align pipes carefully before joining.
  - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material.
  - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed shall be removed, cleaned and lubricated and replaced before joining is attempted.
  - .6 Complete each joint before laying next length of pipe.
  - .7 Minimize joint deflection after joint has been made to avoid joint damage.
  - .8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .15 Cut pipes as required for special inserts, fittings or closure pieces in a neat manner, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .16 Make watertight connections to maintenance holes. Use non-shrink grout when suitable gaskets are not available.
- .17 Upon completion of pipe laying and after Departmental Representative has inspected pipe joints, place minimum 150 mm granular bedding material around and over top of pipes and compact as for bedding material. Backfill remainder of trench with excavated material.
- .18 Plug service laterals with water tight caps or plugs as approved by Departmental Representative.
- .19 Place location marker at ends of plugged or capped unconnected sewer lines.

3.4 FIELD TESTING

- .1 Test force main in presence of Departmental Representative.
- .2 Brace caps, bends and tees to prevent movement during tests.
- .3 Expel air from main by slowly filling with water. High points to be drilled and tapped and suitable cocks installed to vent air and to be shut when pressure is applied. Remove cocks after satisfactory testing and seal holes with tight fitting plugs.
- .4 Apply hydrostatic test pressure of 690 kPa based on lowest point in line and corrected to elevation of test gauge for hydrostatic test and 345 kPa for leakage test.
- .5 Apply pressures for 1 h for pressure test and 2 h for leakage test.
- .6 Remove defective joints, pipe and fittings where found and replace with new sound material.
- .7 Define leakage as amount of water from source tank in order to maintain test pressure for 2 h. Allowable leakage to be as defined in AMSI/AWWA C600-10.
- .8 Repeat testing until test results fall within accepted allowances.
- .9 Upon the approval of the Departmental Representative CCTV inspection shall be considered an approved alternative to the testing outlined above. Contractor to submit copies of video inspections and reports to Departmental Representative for review and approval.

PART 1 - GENERAL

1.1 REFERENCES

- .1 ATSM International
  - .1 ASTM F667-06, Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.
- .2 CSA International
  - .1 CAN/CSA-G401-07, Corrugated Steel Pipe Products.
- .3 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.

1.2 MEASUREMENT AND  
PAYMENT PROCEDURES

- .1 Measure 300mmØ CSP Culvert included in work in linear metres. All additional work is to be included in balance of project.

1.3 ACTION AND  
INFORMATIONAL  
SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

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

PART 2 - PRODUCTS

2.1 CORRUGATED  
STEEL PIPE

- .1 Corrugated steel pipe: to CAN/CSA-G401, as per OPSS 1801 galvanized, profile 68x13mm x 1.6mm thick.

2.2 CORRUGATED  
POLYETHYLENE PIPE  
AND FITTINGS

- .1 Polyethylene resin: to ASTM D1248, grade W9.
- .2 Weathering resistance: to ASTM D1248.

2.3 GRANULAR  
BEDDING AND  
BACKFILL

- .1 Granular bedding and backfill material to Section 31 23 33.01.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 TRENCHING

- .1 Do trenching Work in accordance with Section 31 23 33.01.
- .2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe.

3.3 BEDDING

- .1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.
- .2 Place bedding as indicated on contract drawings.
- .3 Place bedding in unfrozen condition.

3.4 LAYING  
CORRUGATED STEEL  
PIPE CULVERTS

- .1 Begin pipe placing at downstream end.
- .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
- .3 Lay pipe with outside circumferential laps facing upstream.



3.5 CLEANING .1 Progress Cleaning: clean in accordance with  
Section 01 74 11.

PART 1 - GENERAL

- |   |    |   |
|---|----|---|
| <u>1.1 RELATED SECTIONS</u>                   | .1 | Section 31 23 33.01: Excavating, Trenching and Backfilling.   |
|   | .2 | Section 33 05 14: Maintenance Holes and Catch Basins.   |
| <u>1.2 MATERIAL CERTIFICATION</u>             | .1 | Contractor shall verify material type and size prior to ordering/installing new storm sewer.  |
|   | .2 | At least 2 weeks prior to commencing work, submit manufacturer's test data and certification that pipe materials meet requirements of this section. |
| <u>1.3 SCHEDULING OF WORK</u>                 | .1 | Schedule work to minimize interruptions to existing services.   |
|   | .2 | Maintain existing flow during construction and provide pumping as required.   |
|   | .3 | Submit schedule of expected interruptions for review and adhere to approved schedule.   |
| <u>1.4 MANUFACTURER'S INSTRUCTIONS</u>        | .1 | Make available 1 copy of manufacturer's installation instructions.  |
| <u>1.5 MEASUREMENT AND PAYMENT PROCEDURES</u> | .1 | Measure 525mmØ Storm Sewer Pipe in linear metres. All additional work is to be included in balance of project.                                      |
|   | .2 | Measure 300mmØ Storm Sewer Pipe in metres. All additional work is to be included in balance of project.   |

ART 2 - PRODUCTS

- |                         |    |  |
|-------------------------|----|--|
| <u>2.1 PLASTIC PIPE</u> | .1 | Gravity sewer pipe and fittings: Type PSM Poly (Vinyl Chloride): to ASTM D3034-08. |
|                         | .1 | Standard Dimension Ratio (SDR): 35.  |
|                         | .2 | Locked-in gasket and integral bell system.   |
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|--|----|--|
| <u>2.1 PLASTIC PIPE<br/>(Cont'd)</u>     | .1 | (Cont'd)   |
|  | .3 | Nominal lengths: 4 m.  |
| <u>2.2 PIPE BEDDING<br/>MATERIALS</u>    | .1 | Granular material: Granular A as per OPSS 1010.  |
| <u>2.3 INSULATION</u>                    | .1 | HI-40 DOW rigid insulation, or approved equivalent, 50mm thick insulation boards installed as per manufacturer's specifications.                                   |
| <u>2.4 COUPLER</u>                       | .1 | Use appropriate sized pipe coupler will to join existing to new storm sewer.   |
| <u>PART 3 - EXECUTION</u>                |    |  |
| <u>3.1 PREPARATION</u>                   | .1 | Clean pipes and fittings of debris and water before installation. Carefully inspect materials for defects before installing. Remove defective materials from site. |
| <u>3.2 TRENCHING AND<br/>BACKFILLING</u> | .1 | Do trenching and backfilling in accordance with Section 31 23 33.01.   |
|  | .2 | Trench line and depth require approval prior to placing bedding material and pipe.   |
|  | .3 | Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by Departmental Representative.     |
|  | .4 | If cover of 1.5 meters is not maintained, insulation must be used.   |
| <u>3.3 GRANULAR<br/>BEDDING</u>          | .1 | Place granular bedding materials to details indicated or directed.   |

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3.3 GRANULAR  
BEDDING  
(Cont'd)

- .2 Shape bed true to grade and to provide continuous, uniform bearing surface for barrel of pipe. Do not use blocks when bedding pipe.
- .3 Shape transverse depressions as required to receive bell if bell and spigot pipe is used.
- .4 Compact full width of bed to at least 100% Standard Proctor Density.
- .5 Use bedding stone in lieu of sand bedding material when directed.
- .6 Fill excavation below bottom of specified bedding adjacent to maintenance holes or catch basins with bedding material or common backfill as directed.

3.4 INSTALLATION

- .1 Lay and join pipe in accordance with manufacturer's recommendations.
- .2 Handle pipe by approved methods. Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .5 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .6 Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.
- .7 Position and join pipes by approved methods. Do not use excavating equipment to force pipe sections together.
- .8 Joints:
  - .1 Install gaskets in accordance with manufacturer's recommendations.
  - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

3.4 INSTALLATION  
(Cont'd)

- .8 (Cont'd)
- .3 Align pipes carefully before joining.
  - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material.
  - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed shall be removed, cleaned and lubricated and replaced before joining is attempted.
  - .6 Complete each joint before laying next length of pipe.
  - .7 Minimize joint deflection after joint has been made to avoid joint damage.
  - .8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .9 When any stoppage of work occurs, block pipes as directed to prevent "creep" during down time.
- .10 Plug lifting holes with approved prefabricated plugs set in non-shrink grout.
- .11 Cut pipes as required for special inserts, fittings or closure pieces in a neat manner, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave a smooth end at right angles to axis of pipe.
- .12 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes. Joint to be structurally sound and watertight.
- .13 Plug open upstream ends of pipes with removable watertight concrete, steel or wooden bulkheads.



## **Environmental Effects Evaluation (EEE) Report**

### **Section 67 of the**

### **Canadian Environmental Assessment Act, 2012**

#### **Site Development and Parking Lot Expansion At Collins Bay and Frontenac Institutions, Kingston, Ontario PSPC Project No. R079099.001 DFRP No. 22374**

Submitted to:

Public Services and Procurement Canada  
Environmental Services, Professional and Technical Programs - Ontario Region  
4900 Yonge Street, 11th Floor  
Toronto, Ontario M2N 6A6

Submitted by:

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**March 2018**

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**PART A: PROJECT INFORMATION**

|  |  |
|--|--|
| <b>Project Title:</b>  | Site Development and Parking Lot Expansion at Collins Bay and Frontenac Institutions   |
| <b>Project Location:</b>   | Collins Bay Institution, Kingston, Ontario<br>(Directory of Federal Real Property Number 22374)  |
| <b>Lead Federal Authority:</b>   | Correctional Service Canada (CSC)  |
| <b>CSC Contact:</b>  | Tim Slater<br>Chief Facilities Maintenance<br>Collins Bay (CSC)<br>Tim.Slater@csc-scc.gc.ca<br>Phone: 613-536-6276   |
| <b>PSPC Contact:</b>   | Lee Chan<br>Environmental Specialist<br>Public Services and Procurement Canada – Ontario Region<br>4900 Yonge St., 11 <sup>th</sup> Floor<br>Toronto, ON M2N 6A6<br>Lee.Chan@tpsgc-pwgsc.gc.ca<br>Phone: 416-512-5948        |
| <b>EEE Assessor Contact:</b>   | Jeff Balsdon<br>Senior Environmental Ecologist<br>Amec Foster Wheeler Environment & Infrastructure<br>900 Maple Grove Road, Unit 10<br>Cambridge, ON N3H 4R7<br>Jeff.Balsdon@amecfw.com<br>Phone: 519-650-7147               |
| <b>MNRF Peterborough District Contact:</b><br>(in case of SAR encounter) | Catherine Warren<br>Ministry of Natural Resources and Forestry<br>Peterborough District<br>South Tower 1 <sup>st</sup> Flr. 300 Water St.<br>Peterborough, ON, K9J 8M5<br>catherine.warren@ontario.ca<br>Phone: 705-755-3294 |
| <b>ECCC CWS Contact:</b><br>(in case of SAR encounter)                   | Canadian Wildlife Service<br>Environment and Climate Change Canada<br>4905 Dufferin St.<br>Downsview, ON M3H 5T4<br>wildlife.ontario@ec.gc.ca<br>Phone: 416-739-5830   |
| <b>PSPC Project Number:</b>  | R079099.001  |

## **PART B: SCOPE OF PROJECT**

### **B.1 Project Description**

Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler) was retained by Public Services and Procurement Canada (PSPC; formerly Public Works and Government Services Canada) on behalf of Correctional Services Canada (CSC) to prepare an Environmental Effects Evaluation (EEE) Report for the proposed Site Development and Parking Lot Expansion at the Collins Bay and Frontenac Institutions in Kingston, Ontario (the Project) (Appendix A – Figure 1).

Within the context of the *Canadian Environmental Assessment Act, 2012* (CEAA), the Project is taking place on federally-owned land, and as such, CSC must meet their Section 67 requirements to ensure that the Project does not result in significant environmental effects. The goal of the EEE is to identify and mitigate potential adverse environmental impacts of the Project as early as possible in the project design stage, so as to ensure that irrevocable decisions are not made without due consideration to environmental consequences.

Correctional Services Canada is proposing to expand and reconfigure existing parking lots and improve the existing roadway infrastructure located at the Collins Bay and Frontenac Institutions. The Collins Bay Institution (medium-security) and Frontenac Institution (minimum-security) are located on 11.3 hectares (ha) of federally-owned land, which is surrounded by a perimeter wall and patrol road for security. The site is bordered by Bath Road to the north, Front Road to the south, Days Road to the west and part of the Little Cataraqui Creek Wetland Complex to the east (Appendix A – Figure 1).

Changes at the institutions have increased the demand for on-site parking, which has exceeded the current capacity. This Project involves the design and creation of additional parking along with alterations to pedestrian and vehicular traffic routes. The Project area consists of paved areas, buildings, and manicured landscape features, some of which will be maintained. The Project activities will include the removal of maintained grass (lawn) areas, re-configuration of paved areas, work involving electrical conduits and lighting, drainage works, landscaping, and new construction. No buildings will be altered during Project activities.

This Project will involve the removal of some existing parking lots, construction of new parking lots, and expansion of existing parking lots and reconfiguration of roads around the institutions. The current parking areas (Appendix A – Figure 2) consist of 359 parking spaces, and upon the completion of construction 452 parking spaces will exist (excluding P3 which will be constructed at a later date). Parking lots P1, P2, P3, P4, P5, and P6 will be constructed/reconfigured while P8 and P9 will be expanded upon. Parking lot P7 will remain in its current state. The majority of construction will occur in areas that are currently roads, pedestrian paths, or parking areas (Appendix A – Figure 3).

The Project also involves the replacement of a watermain partially under parking lot P2 and the existing entrance to the facility. The exact location of the existing watermain and replacement segment is unknown at this time. The watermain may be constructed using the “cut-and-cover” method, where a length of trench is excavated, the pipe is placed and connected to the previous section, and the trench is backfilled with material excavated from the trench, if suitable, or with clean imported materials. The Project scope, including Project phases and components, is provided in Table 1.

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**Table 1: Project Scope**

| Project Phase  | Project Components   |  |
|--|--|--|
|  | Core Project Components  | Ancillary Works<br>Other Projects & Activities   |
| All construction related activities                              | Site development and parking lot expansion.  | Before commencing work, verify buried services on and adjacent to work site. Utility locates by the owner of the utility, or authorities having jurisdiction, are required prior to commencement of work.<br><br>Develop a traffic management plan to maintain and protect traffic on affected roads during construction period, unless otherwise directed by Departmental Representative. |
| Site preparation / removal                                       | Remove existing asphalt pavement without damage or disturbing underlying pavement.<br><br>Vegetation clearing and grubbing (maintained lawn and planted trees) and asphalt removal.<br><br>Where applicable, restore disturbed areas outside of demolition zone to match condition of adjacent, undisturbed areas. | None.  |
| Road/pathway, parking lot construction and watermain replacement | Install and reconfigure parking areas, roadways, and walkways.<br><br>Parking lots P1, P2, P3, P4, P5, P6, P8, and P9 to be constructed, reconfigured and/or expanded.<br><br>Install curbs and gutters.<br><br>Install infrastructure features.<br><br>Remove and replace watermain.                              | None.  |
| Landscape  | Restore existing landscaping features affected by construction.<br><br>Install new landscaping features as detailed in the Design Concept Plan (Appendix A – Figure 3).  | None.  |
| Operation  | Operation of expanded parking lots and roadways/pathways to accommodate institution needs.   | Scheduled maintenance, and operational quality control.  |

### **B.2 Scheduling**

Construction is expected to commence Spring of 2018 and be completed Fall of 2018.

### **B.3 Regulatory**

PSPC requires that any and all stipulations of federal, provincial, or municipal authorities and/or their officers must be strictly followed. As a best practice, the most stringent standards must be used where applicable. The following is a summary of applicable federal legislation:

*Species at Risk Act, 2002 (SARA)* – to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species that are extirpated (no longer living in the wild in Canada), Endangered, or Threatened as a result of human activity, and to manage species of Special Concern to prevent them from becoming, Extirpated, Endangered or Threatened.

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*Fisheries Act* – to address threats to fish from habitat loss/degradation and changes to natural flow regimes and to protect fish and fish habitat. Proponents that plan to undertake activities in or near water that have the potential to negatively affect fisheries are responsible for avoiding, mitigating, and offsetting ‘serious harm to fish’, as described in the Act.

*Migratory Birds Convention Act, 1994* (MBCA) – to protect most species of migratory and non-migratory birds, their nests and eggs, anywhere found in Canada. Proponents that plan to undertake activities which may inadvertently harm, kill, disturb or destruct migratory birds, nests or eggs are responsible for complying with Avoidance Guidelines and Best Management Practices as per the regulations.

*Canadian Environmental Assessment Act, 2012* (CEAA) – to guide/ensure the environmental assessment of certain activities and the prevention of significant adverse environmental effects.

*Canadian Environmental Protection Act, 1999* (CEPA) – to respect pollution prevention and the protection of the environment and human health in order to contribute to sustainable development.

The following is a summary of applicable provincial legislation:

*Endangered Species Act, 2007* (ESA) – to identify species at risk using the best scientific information, to protect species at risk and their habitats, to promote the recovery of species at risk and promote stewardship activities to assist in the protection and recovery of species at risk.

*Fish and Wildlife Conservation Act, 1997* (FWCA) – to regulate hunting, trapping, fishing, and related activities and the sale, purchase, and transport of wildlife and pelts. This Act also regulates the care and maintenance of live wildlife and fish.

### **B.4 Resource Requirements (Energy, Water)**

A general contractor will be contracted to supply all required materials and labour to construct the structures. Demand on natural resources is determined to be normal and will include: water for the mixing of concrete, crushed stone/gravel, steel, and metal; as well as energy for transport and structural work. It is expected that materials will be brought in from local sources, keeping emissions and energy at a minimum.

### **B.5 Construction Methods**

Construction methods will follow general industry standards.

### **B.6 Discharges**

There will not be any discharges of water or wash water to the natural environment, ditches or the sanitary sewer system on CSC property unless the water has been treated and sediment removed, as per the construction specifications and /or the mitigation measures described within this document, and must be authorized by Department Representatives in writing prior to discharge.

## **PART C: SCOPE OF EVALUATION**

Information included in this report has been compiled from a site visit on January 24, 2017, cited sources, as well as the following background information:

- November 9, 2016. Public Works and Government Services Canada, Statement of Work, Environmental Effects Evaluation, Site Development and Parking Lot Expansion Collins Bay and Frontenac Institutions, Kingston, Ontario. (PWGSC 2016);
- August 21, 2015, Correctional Services Canada, Collins Bay and Frontenac Institutions, Site Development and Parking Expansion, Project Brief – Revision 1. (CSC 2015);
- January 2015, Chapter 7. Environment and Sustainability. Correctional Services Canada, Collins Bay and Frontenac Institutions, Site Development and Parking Expansion Study: Summary Report and Recommendations. (CIMA 2015);
  - Collins Bay and Frontenac Institutions, Figure 1: Existing Land Use Map. (Figure 2)
  - Collins Bay and Frontenac Institutions, Figure 9: Design Concept Plan. (Figure 3)
- December 23, 2015. Public Works and Government Services Canada, Preliminary Identification of Environmental Services Required. (PWGSC 2015)
- Collins Bay Institution Site Development and Parking Expansion Plans and Specifications.

### **C.1 Environmental Setting**

The Collins Bay Institution is located on 11.3 ha of federally-owned land in Kingston, Ontario. The institution is bordered by a perimeter wall with an exterior patrol road for security. The landscape outside the perimeter wall is a mixture of buildings, paved areas, manicured lawn, and agriculture.

Agricultural buildings are present just southwest of the perimeter wall, with agricultural fields located to the south and west. Parking, manicured lawn, and planted deciduous trees occur north of the wall for approximately 125 m, up to Bath Road which runs east/west. Institution buildings (e.g., pharmacy, garage, and materials handling) and paved areas are immediately east of the wall, with manicured lawn extending farther east. A Provincially Significant Wetland (PSW), Little Cataraqui Creek Wetland Complex, is present over 200 m east of the perimeter wall. Two small tributaries, located east and southeast of the wall, are present and flow into the wetland complex. The tributary east of the wall is part of the PSW. These tributaries are located outside of the proposed work area; however, the tributary east of the wall (north tributary) receives runoff from the existing Lot P5 and associated paved area, which is unaltered in the proposed plan (Appendix A – Figures 2 & 3).

The proposed work area occurs north and east of the perimeter wall, consisting mainly of paved areas (roads and pedestrian paths), buildings, and native and non-native vegetated areas. The majority of the vegetated area is manicured lawn, though planted mature deciduous trees are present. The landscape within 100 m of the proposed work area is also mainly paved areas (roads and pedestrian paths), buildings, and manicured lawn with some planted vegetated areas.

The current land use in areas where parking lots are proposed is as follows (Appendix A – Figures 2 & 3):

- P1 – manicured lawn and planted trees/shrubs. Several pine trees (*Pinus sp.*) to be removed.
- P2 – parking lot and road;
- P3 – manicured lawn;
- P4 – parking lot and road/path;
- P5 – parking lot (north portion), manicured lawn (3 spaces beside pharmacy);
- P6 – parking lot, 1 tree to be removed;

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- P8 – parking lot, manicured lawn;
- P9 – parking lot, manicured lawn; and
- Watermain – parking lot, facility entrance, manicured lawn.

A previous report (CIMA 2015) lists a contaminated site within the proposed work area. This site is the previous location of two 13,638 litre petroleum fuel underground storage tanks and an associated pump island that were removed in 2000 (exp 2017). Exp Services Inc.'s 2017 Risk Assessment Report details the results of their Human Health Preliminary Quantitative Risk Assessment and Screening Level Ecological Risk Assessment including a discussion of previous findings on site. The Risk Assessment Report concluded that based on the current land usage (i.e., commercial, non-potable), no unacceptable risks were identified to human health or ecological receptors, and no risk management is required or recommended (exp 2017). However, as a best management practice, workers should be notified that construction activities in the area may encounter impacted soils and exposure is only expected to occur for the construction worker via incidental ingestions (exp 2017).

Monitoring wells previously located in the work area were decommissioned in the winter of 2016-2017.

### **C.2 Physical Environment**

#### **Physiography**

Physiography is the description of the land surface as controlled by underlying bedrock and unconsolidated surficial materials that overlie bedrock and that are the parent material for the soils. Physiographic units typically have similar rock type sequences, geological structures and history.

The City of Kingston, Ontario lies in the Grenville Province of the Canadian Shield (Chapman and Putnam 1966). Sedimentary rock limestone is present in the Kingston area, with the presence of stylolites. Metamorphic Quartzite, Gneiss and Marble rocks are also present (Museum 2017). No large exposed rocks were observed within the project area during the January 2017 site visit.

The site is located in the most southern portion of the Great Lakes – St. Lawrence Forest Region, which borders the St. Lawrence River, continuing west through central Ontario to Lake Huron and west of Lake Superior. Hardwood forests combined of deciduous and coniferous trees are common within this Region. The Deciduous Forest Region occurs just west of Kingston (MNRF 2015a).

#### **Hydrology/Topography**

The topography of existing and proposed parking lots is generally flat. West of Lot P6 the landscape slopes gradually to the west, with runoff dissipating into the manicured lawn. Along the drainage feature southeast of Lot P5 and east of Lot P7, the landscape on both sides slopes down toward the drainage feature. This feature is part of the PSW and receives runoff from Lot P5 and Lot P7 as well as the adjacent landscape. South of Lot P9 the topography slopes gently south, away from the institutions. The south drainage feature also receives runoff from the property. Both drainage features flow into the PSW (Appendix A – Figure 2). Increased drainage from paving the parking Lot P5 is not expected to affect hydrology of the PSW to the east due to the small size of the proposed lots (approximately 700m<sup>2</sup>)

Northeast of Lot P2 and Lot P3, east of proposed Lot P1, and immediately north of Sally Port Road is a low-lying area which receives storm water from the area northeast of the perimeter wall. During the January 24, 2017 site visit a shallow path of water was present in this area. This eventually drains east into the PSW, along with runoff from surrounding existing paved areas (Appendix A – Figure 2).

### **C.3 Biological Environment**

#### **Aquatic Systems**

The Little Cataraqui Creek Wetland Complex is a PSW and an Environmental Protected Area under the City of Kingston Official Plan; it is located approximately 200 m east of the institutions. The Little Cataraqui Creek was dammed in 1971 to control flooding in the area (CRCA 2016). The headwaters are located north of Highway 401 and the wetland complex drains south to Cataraqui Bay and ultimately Lake Ontario. The creek is over 100 m wide in the area adjacent to the institutions property. Dense cattail (*Typha sp.*), forbs, graminoids, shrubs, and trees border both sides of the creek.

Two small tributaries of the wetland are located on the federal property and are located more than 30 m outside the proposed work area. The tributary east of the institutions (east of Lot P7) currently receives runoff from the concrete grounds of the visitor area and outside the materials building, and adjacent landscape. Similarly, runoff from the proposed work on Lot P5 will flow to this tributary and ultimately the PSW which it feeds. Mitigation measures to prevent sedimentation to the PSW have been included in Table 4 below. This drainage will remain unchanged following the proposed project. The banks are approximately 1.5 m high and the bed is approximately 3 m to 4 m wide. At the time of the site visit approximately 0.05 m water depth was present in the tributary within the first 30 m of the tributary. Dense cattail was present in the tributary and the banks were heavily vegetated with forbs and graminoids. The tributary gradually widens as it approaches the creek.

The south tributary also receives runoff from adjacent land, including areas to the north and agricultural areas to the west and south. This tributary is approximately 1 m wide with shallow banks densely vegetated with forbs and graminoids, and minor amounts of cattail. The flowing water was approximately 0.05 m deep during the January 24, 2017 site visit. This tributary is generally open and widens as it approaches the PSW (Appendix A – Figure 2b).

The low-lying area east of proposed Lot P1 is manicured lawn which receives runoff from the adjacent manicured lawn and paved areas. Runoff would saturate this area in certain conditions and this eventually drains east into dense cattails and the PSW.

A creek running north/south, approximately 1 m to 5 m wide, is present over 400 m west of Lot P6. This creek is surrounded by forbs and graminoids on both sides.

#### **Vegetation**

The majority of the vegetation is manicured lawn. Planted vegetation such as pine and maple (*Acer sp.*) trees are present within the federal property and proposed work area. The majority of the trees and shrubs will not be directly impacted by the proposed project. The decorative tree line running north/south in front of the entrance building will not be affected by the proposed project (Appendix A – Figure 2b).

As stated previously, cattails, forbs, graminoids, shrubs (e.g., dogwood (*Cornus sp.*)) and deciduous trees are present along the tributaries and PSW. Direct impacts to vegetation in this area is not anticipated due to the Project.

#### **Species at Risk**

In Ontario, SAR include both plant and animal species whose individuals or populations are considered Extirpated, Endangered, Threatened, or Special Concern, as determined by the provincial Committee on the Status of Species at Risk in Ontario (COSSARO) and the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species at Risk and their critical habitat are regulated by the provincial ESA and the federal SARA.

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In Ontario, the SARA regulates SAR on federally-owned lands, but defers the responsibility of regulating SAR on private lands to the provincial ESA.

On federal lands, species listed under Schedule 1 as Extirpated, Endangered or Threatened are protected under Section 32 and 33 of SARA. The general prohibitions of SARA outline that no person shall kill, harm, harass, capture, take, possess, collect, sell or buy any species, or parts and derivatives thereof, listed as Extirpated, Endangered or Threatened, and that no person shall destroy or damage the residence or critical habitat of any listed species. These protection measures under Schedule 1 do not apply to Special Concern species; however, due diligence should be enforced if a Special Concern species or their habitat is present.

Similarly on non-federal lands (including private property), species listed under the ESA as Extirpated, Endangered, or Threatened are protected under Sections 9 of the Act which prohibits killing, harming, and harassing the SAR and Section 10 of the Act which prohibits damaging or destroying the habitat of the species. The regulations may specifically prescribe an area as the habitat of a SAR, but if no habitat regulation is in force with respect to a species, "habitat" is defined to mean an area on which the species depends, directly or indirectly, to carry on its life processes. Species listed as Special Concern are not afforded protection under Sections 9 and 10 of the ESA; however, due diligence should be enforced if a Special Concern species or their habitat is present.

As the Project is located on federal lands, it is Schedule 1 of the federal SARA that protects listed species on site. Furthermore, PSPC requires that any and all stipulations of federal, provincial, or municipal authorities and/or their officers must be strictly followed. As a best practice, the most stringent standards must be used where applicable. Any discrepancies must be successfully resolved before the pertinent work may begin. For example, in situations where a SAR is protected under the ESA but not SARA, requirements as set out by the ESA, regardless of the site's federal ownership, must be adhered to.

Potential SAR occurring on the property are listed in Table 2, based on a review of MNRF data (MNRF 2016a) along with Chapter 7 of the 2015 CIMA report. The report information was summarized from a report received by CSC, listing potential SAR due to species and/or habitat observations on the farm/agricultural portions of the property and information from the Natural Heritage Information Centre (NHIC) and the Ontario Breeding Bird Atlas (OBBA). The NHIC, OBBA and Amphibian and Reptile Atlas of Ontario were reviewed again for updated information to include in this report. Review of the NHIC one-kilometre (km) square grid showing SAR did not include any records of provincial SAR located within or immediately adjacent to the proposed Project site within the last 30 years.

The Ministry of Natural Resources and Forestry (MNRF) was contacted via email regarding the potential for SAR records within the vicinity of the project site. A response dated May 25, 2017 (Appendix B) was received from MNRF and their records have been included below.

### *Potential Species at Risk Occurrence*

To assess the potential for SAR to occur within the work area, additional information is provided in Table 2, related to habitat needs for SAR, as well as a probability rank related to the likelihood of the species occurring within the work area. These probabilities are based on an assessment of each species habitat preferences/needs in conjunction with existing conditions observed during a 2017 field investigation and background information. These findings do not confirm presence or absence from the site; furthermore, additional SAR may come into the area or species already occurring in the area may have their status updated at any time. For this reason, ongoing communication with Environment and Climate Change Canada (ECCC) and MNRF is recommended to ensure compliance with SARA and the ESA, respectively.



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Due to the urban/industrial landscape of the proposed work area, traffic, and the minimal amount of vegetation other than manicured lawn, if any SAR are in close proximity to the institutions they probably occur within the natural area of the PSW or the agricultural land. As such, species with a Moderate probability of occurrence are those recorded in the vicinity of the project, but have limited suitable habitat within the study area. Species with Moderate probabilities of occurrence may not occur within the proposed work area frequently or not at all, but may intermittently use it for foraging, migration, or movement to other parts of their home-range. Species that are listed as Low potential, may be observed within the work area due to the potential for occurrence in nearby habitats. During the construction phase, it is likely that these species would avoid the Project site due to the presence of humans and construction activity.

Thirty-three of the SAR identified through the secondary source search and MNRF correspondence are considered to potentially occur within or in proximity to the site based on habitat preferences for each species. These species include:

- Bald Eagle – **Low**
- Bank Swallow – **Low**
- Barn Owl – **Low**
- Barn Swallow – **Low**
- Black Tern – **Low**
- Bobolink – **Low**
- Chimney Swift – **Low**
- Common Nighthawk – **Low**
- Eastern Wood-Pewee – **Low**
- Eastern Meadowlark – **Low**
- King Rail – **Low**
- Least Bittern – **Low**
- Loggerhead Shrike – **Low**
- Louisiana Waterthrush – **Low**
- Northern Bobwhite – **Low**
- Peregrine Falcon – **Low**
- Red-headed Woodpecker – **Low**
- Red-shouldered Hawk – **Low**
- Short-eared Owl – **Low**
- Wood Thrush – **Low**
- Yellow-breasted Chat – **Low**
- Blanding's Turtle – **Low**
- Common Five-lined Skink – **Low**
- Eastern Hog-nosed Snake – **Low**
- Eastern Musk/Stinkpot Turtle – **Low**
- Eastern Ribbonsnake – **Low**
- Gray Ratsnake – **Low**
- Milksnake – **Moderate**
- Northern Map Turtle – **Low**
- Snapping Turtle – **Low**
- Spiny Softshell Turtle – **Low**
- Grey Fox – **Low**
- Monarch – **Moderate**

Ten of the SAR identified through the secondary source search and MNRF correspondence are considered absent from the Project site due to the lack of suitable habitat. These species include:

- Cerulean Warbler
- Golden Eagle
- Henslow's Sparrow
- American Eel
- Lake Sturgeon
- Blunt-lobed Woodsia
- Broad Beech Fern
- Butternut
- Pale-bellied Frost Lichen
- Purple Twayblade

Additionally, there are three locally significant plants within wetland areas that may be present in proximity to the proposed work area: Crested Sedge (*Carex cristatella*), Pale Sedge (*Carex pallescens*) and Sessile-leaved Bellwort (*Uvularia sessilifolia*). These species are not yet afforded protection under any federal or provincial legislation.

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**Table 2: Potential for Listed SAR to Occur within Proposed Work Area**

| <b>Species Name, Status (SARA<sup>1</sup>, ESA<sup>2</sup>, S-Rank<sup>3</sup>), and Data Source<sup>4</sup></b>  | <b>Preferred Habitat</b>   | <b>Potential for SAR Habitat/ Occurrence on the Site</b>  |
|---|--|---|
| <b>Birds</b>  |  |   |
| <p>Bald Eagle<br/>(<i>Haliaeetus leucocephalus</i>)</p> <p>SARA: No Status<sup>5</sup><br/>ESA: Special Concern<br/>S-Rank: S4<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p> | <p>Bald Eagle habitat is mature forest with scattered supercanopy trees located adjacent to large productive waterbodies. Nest trees are generally among the largest available trees in the area, with a full crown and multiple accessible perches. The trees typically have accessible broad crotches capable of supporting a nest, and unobstructed view and flight paths in all directions, but especially towards the water. Bald Eagles will nest in a variety of trees that can provide the required structural characteristics (Armstrong 2014).</p> | <p><b>Low</b> – the nearby wetland complex provides suitable habitat but there is none within the proposed work area.</p>   |
| <p>Bank Swallow<br/>(<i>Riparia riparia</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>                       | <p>Nesting occurs in vertical or near vertical banks of substrate such as fine sand or silt, such as eroding lake bluffs and river banks, topsoil piles in construction areas and extraction faces in aggregate pits. Foraging occurs in a variety of open terrestrial and aquatic habitats (Falconer et. al. 2016).</p>   | <p><b>Low</b>- no suitable nesting habitat in the immediate vicinity of the Project. Suitable foraging habitat possibly present nearby.</p>   |
| <p>Barn Owl<br/><i>Tyto alba</i></p> <p>SARA: Endangered<br/>ESA: Endangered<br/>S-Rank: S4<br/>Source: CIMA (2015), ECCC (2017a)</p>   | <p>In Ontario, generally found within 50 km of the Great Lakes. Nests and roosts in barns, abandoned buildings and natural cavities in trees or holes in cliff faces. Hunts in orchards and grasslands (MNR Frontenac Region 2016a).</p>   | <p><b>Low</b> – the institutions are less than 5 km from Lake Ontario with abundant tree cover in the adjacent wetland complex. Fields south of institutions may be suitable for hunting.</p>   |
| <p>Barn Swallow<br/>(<i>Hirundo rustica</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>                       | <p>Often found feeding in a range of open habitats including fields, marshes, meadows, and ponds. They primarily use man-made structures such as building, bridges, and culverts for nesting (COSEWIC 2011a).</p>  | <p><b>Low</b> – adjacent fields and waterbodies may be suitable for foraging. Barn Swallow nesting areas have been reported along the south side of the perimeter fence (pers. comm. CSC). However, these areas will not be impacted by Project activities.</p> |
| <p>Black Tern<br/>(<i>Chelidon nigricans</i>)</p> <p>SARA: No Status<sup>5</sup><br/>ESA: Special Concern<br/>S-Rank: S3B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>      | <p>Build floating nests on shallow marshes, often in cattails. Nests are in loose colonies (MNR Frontenac Region 2016b).</p>   | <p><b>Low</b> – the nearby wetland complex provides suitable habitat but there is none within the proposed work area.</p>   |

### **Environmental Effects Evaluation (EEE) Report**

| <b>Species Name, Status (SARA<sup>1</sup>, ESA<sup>2</sup>, S-Rank<sup>3</sup>), and Data Source<sup>4</sup></b>   | <b>Preferred Habitat</b>   | <b>Potential for SAR Habitat/ Occurrence on the Site</b>  |
|--|--|---|
| <p>Bobolink<br/>(<i>Dolichonyx oryzivorus</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>            | <p>Bobolink nest primarily in forage crops, hayfields and associated pastures are their preferred habitat. Bobolink also occur in wet prairie, graminoid peatlands and abandoned fields dominated by tall grasses, no-till cropland, small-grain fields, reed beds and irrigated fields in arid regions. The species does not generally occupy fields of row crops such as corn, soybean and wheat, pastures in valleys which high shrub density or intensively grazed pastures (COSEWIC 2010a).</p> | <p><b>Low</b> – fields south of the institutions may provide suitable habitat but there is none within the proposed work area.</p>                                    |
| <p>Cerulean Warbler<br/>(<i>Setophaga cerulea</i>)</p> <p>SARA: Endangered<br/>ESA: Threatened<br/>S-Rank: S3B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>        | <p>Cerulean Warblers are associated with large mature deciduous forests with tall trees and an open understory. They are found in both wet bottomland forests and upland areas. In Ontario the species favours mature deciduous stands dominated by oak-maple, often in association with swampy bottomland (COSEWIC 2010b).</p>  | <p><b>None</b> – suitable habitat absent within and adjacent to the work area.</p>  |
| <p>Chimney Swift<br/>(<i>Chaetura pelagica</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S4B, S4N<br/>Source: MNR Frontenac Region (pers. comm. 2017)</p>         | <p>Mainly associated with areas where the birds can find chimneys to use as nesting and resting sites; however, it is likely that a small portion of the population continues to use hollow trees. Tend to be close to water for foraging (COSEWIC 2007a).</p>   | <p><b>Low</b> – hollow trees may be present nearby; however, nearby habitat from chimneys may be limited. The wetland complex may provide foraging opportunities.</p> |
| <p>Common Nighthawk<br/>(<i>Chordeiles minor</i>)</p> <p>SARA: Threatened<br/>ESA: Special Concern<br/>S-Rank: S4B<br/>Source: ECCC (2017a), CIMA (2015)</p>                     | <p>Breeds in a wide range of open habitats, such as beaches, recently logged or burned-over areas, forest clearings, short-grass prairies, pastures, open forests, marshes, lakeshores, gravel roads, river banks, rocky outcrops or barrens, railways and urban parks (COSEWIC 2007b).</p>  | <p><b>Low</b> – fields south of the institution may provide suitable habitat but there is none within the proposed work area.</p>                                     |
| <p>Eastern Meadowlark<br/>(<i>Sturnella magna</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>        | <p>A bird most common in native grasslands, pastures and savannas. It also uses a wide variety of other anthropogenic grassland habitats. As with other grassland bird species, the suitability of grassland habitat for this species involves a combination of landscape and patch characteristics (COSEWIC 2011b).</p>   | <p><b>Low</b> – fields south of the institutions may provide suitable habitat but there is none within the proposed work area.</p>                                    |
| <p>Eastern Wood-Pewee<br/>(<i>Contopus virens</i>)</p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (pers. comm. 2017)</p> | <p>Breeds mostly in mature and intermediate-age deciduous and mixed forests with an open understory. Forest clearings and edges are usually within the vicinity of its nest. Areas of openness favour bouts of aerial foraging activities (COSEWIC 2012a).</p>   | <p><b>Low</b> – suitable habitat may be in the wooded habitat within the wetland complex.</p>   |

**Environmental Effects Evaluation (EEE) Report**

| Species Name, Status (SARA <sup>1</sup> , ESA <sup>2</sup> , S-Rank <sup>3</sup> ), and Data Source <sup>4</sup>  | Preferred Habitat   | Potential for SAR Habitat/ Occurrence on the Site  |
|---|---|--|
| <p>Golden Eagle<br/>(<i>Aquila chrysaetos</i>)</p> <p>SARA: No Status<sup>6</sup><br/>ESA: Endangered<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>                            | <p>Nest in remote, undisturbed areas, often on steep cliff or riverbank ledges. Hunt in open areas such as large bogs or tundra. Some overwinter in southern Ontario. Found along Lake Erie and Ontario during migration (MNR 2016c).</p>                               | <p><b>None</b> – suitable habitat is not found within or adjacent to the proposed work area.</p>                         |
| <p>Henslow's Sparrow<br/>(<i>Ammodramus henslowii</i>)</p> <p>SARA: Endangered<br/>ESA: Endangered<br/>S-Rank: SHB<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>                               | <p>Henslow's Sparrows require grassland habitat and occur in greater frequency and at higher densities in large patches of suitable habitat. The species has adapted to breed in agricultural grasslands and grasslands on reclaimed surface mines (COSEWIC 2011c).</p> | <p><b>None</b> – suitable habitat is not found within or adjacent to the proposed work area.</p>                         |
| <p>King Rail<br/>(<i>Rallus elegans</i>)</p> <p>SARA: Endangered<br/>ESA: Endangered<br/>S-Rank: S2B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>   | <p>King Rail utilize a wide variety of freshwater marsh habitat types. Large marshes, especially those that contain a range of water level conditions and a variety of habitats are thought to be the species' preferred habitat in Canada (COSEWIC 2011d).</p>         | <p><b>Low</b> – nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p> |
| <p>Least Bittern<br/>(<i>Ixobrychus exilis</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>                                      | <p>Least Bitterns breed exclusively in marshes with emergent vegetation that have relatively stable water levels and interspersed areas of open water (COSEWIC 2009a).</p>  | <p><b>Low</b> – nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p> |
| <p>Loggerhead Shrike<br/>(<i>Lanius ludovicianus migrans</i>)</p> <p>SARA: Endangered<br/>ESA: Endangered<br/>S-Rank: S2B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>                        | <p>Loggerhead Shrike prefers open country such as pastures, grasslands, sagebrush and agricultural fields. In these habitats they require scattered small trees, shrubs or hedgerows for foraging perches and nesting sites (COSEWIC 2004).</p>                         | <p><b>Low</b> – fields south of the institutions may provide suitable habitat.</p>                                       |
| <p>Louisiana Waterthrush<br/>(<i>Seiurus motacilla/Parkesia motacilla</i>)</p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S3B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p> | <p>Generally found in steep, forested ravines with fast-flowing streams. Occasionally found in heavily wooded, deciduous swamps with large pools of open water. Nest on the ground (ECCC 2017b).</p>  | <p><b>Low</b> – nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p> |

**Environmental Effects Evaluation (EEE) Report**

| Species Name, Status (SARA <sup>1</sup> , ESA <sup>2</sup> , S-Rank <sup>3</sup> ), and Data Source <sup>4</sup>   | Preferred Habitat  | Potential for SAR Habitat/ Occurrence on the Site  |
|--|--|--|
| <p>Northern Bobwhite<br/><i>Colinus virginianus</i></p> <p>SARA: Endangered<br/>ESA: Endangered<br/>S-Rank: S1<br/>Source: CIMA (2015), ECCC (2017a)</p>   | <p>Live in grasslands, savannahs, around abandoned farm fields, along brushy fencerows, and similar areas. Nest in natural shallow depressions they line with plant material and conceal (Government of Canada 2017c).</p>   | <p><b>Low</b> – fields south of the institutions may provide suitable habitat.</p>   |
| <p>Peregrine Falcon<br/><i>(Falco peregrinus anatum / tundrius)</i></p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S3B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p> | <p>Most Peregrine Falcons nest on cliff ledges or crevices, but some will also use tall buildings and bridges near good foraging areas (COSEWIC 2007c).</p>  | <p><b>Low</b> – nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p>                   |
| <p>Red-headed Woodpecker<br/><i>(Melanerpes erythrocephalus)</i></p> <p>SARA: Threatened<br/>ESA: Special Concern<br/>S-Rank: S4B<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>         | <p>The Red-headed Woodpecker is found in a variety of habitats, including oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, beaver ponds and burned areas. The open areas where this species breeds usually contain a high density of dead trees that can be used for nesting and perching (COSEWIC 2007d).</p> | <p><b>Low</b> – vegetation in the nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p> |
| <p>Red-shouldered Hawk<br/><i>(Buteo lineatus)</i></p> <p>SARA: Special Concern (Sch. 3)<br/>ESA: Not at Risk<br/>S-Rank: S4B<br/>Source: CIMA (2015), ECCC (2017a)</p>                              | <p>The Red-shouldered Hawk breeds in a variety of forest types, including bottomland hardwood, riparian areas, flooded deciduous swamps and upland mixed deciduous-coniferous forest. Nearby wetlands or other aquatic areas are essential (COSEWIC 2006).</p>   | <p><b>Low</b> – nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p>                   |
| <p>Short-eared Owl<br/><i>Asio flammeus</i></p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S2N, S4B<br/>Source: CIMA (2015)</p>   | <p>Live in open areas such as marshes, tundra, and grasslands. Nest on the ground (ECCC 2017d).</p>  | <p><b>Low</b> – nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p>                   |
| <p>Wood Thrush<br/><i>(Hylocichla mustelina)</i></p> <p>SARA: Threatened<br/>ESA: Special Concern<br/>S-Rank: S4B<br/>Source: MNR (pers. comm. 2017)</p>   | <p>Nests mainly in mature and second-growth deciduous and mixed forests, with saplings and well-developed understory layers. Large forest mosaics are preferred for nesting, small forest segments are also used (COSEWIC 2012b).</p>  | <p><b>Low</b>- suitable forest habitat may be present in the surrounding area.</p>   |

### **Environmental Effects Evaluation (EEE) Report**

| <b>Species Name, Status (SARA<sup>1</sup>, ESA<sup>2</sup>, S-Rank<sup>3</sup>), and Data Source<sup>4</sup></b>  | <b>Preferred Habitat</b>  | <b>Potential for SAR Habitat/ Occurrence on the Site</b>  |
|---|---|---|
| <p>Yellow-breasted Chat<br/><i>Icteria virens virens</i></p> <p>SARA: Endangered<br/>ESA: Endangered<br/>S-Rank: S2B<br/>Source: CIMA (2015)</p>  | <p>Live in thickets and scrub, and spend winters in coastal marshes (MNR 2016d; ECCC 2017e).</p>  | <p><b>Low</b> – nearby wetland complex vegetation may provide suitable habitat but there is none within the proposed work area.</p> |
| <b>Fish</b>   |   |   |
| <p>American Eel<br/>(<i>Anguilla rostrata</i>)</p> <p>SARA: No Status<sup>7</sup><br/>ESA: Endangered<br/>S-Rank: S1?<br/>Source: MNR (pers. comm. 2017)</p>  | <p>The American Eel is a migratory species that uses a variety of freshwater and marine habitats. This species spawns only once, in the Sargasso Sea of the southern North Atlantic Ocean. In fresh water, preferred overwintering habitat can be found in lakes and rivers (COSEWIC 2012c).</p>  | <p><b>None</b> – no waterbody is within the work area.</p>  |
| <p>Lake Sturgeon<br/>(<i>Acipenser fulvescens</i>)<br/>Great Lakes – Upper St. Lawrence River population</p> <p>SARA: No Status<sup>7</sup><br/>ESA: Threatened<br/>S-Rank: S3<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p> | <p>Inhabit large rivers and lakes usually less than 30 feet deep. Spawning usually occurs in high-gradient areas of large rivers, often below waterfalls in depths &lt;2 m, or along rocky lake shorelines exposed to wave action. (Golder Associates Ltd. 2011)</p>  | <p><b>None</b> – no waterbody is within the work area.</p>  |
| <b>Reptiles</b>   |   |   |
| <p>Blanding's Turtle<br/>(<i>Emydoidea blandingii</i>)<br/>Great Lakes – St. Lawrence population</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S3<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>                    | <p>Prefers lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps that are shallow and rich in nutrients, organic soil and dense vegetation. Females dig their nest various loose substrates, including sand, gravel, organic soil and cobblestone up to 400 m from a waterbody (ECCC 2017f).</p>  | <p><b>Low</b> – the nearby wetland complex provides suitable habitat but there is none within the proposed work area.</p>           |
| <p>Common Five-lined Skink<br/>(<i>Plestiodon fasciatus</i>)</p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S3<br/>Source: MNR Frontenac Region (2016a), ECCC (2017a)</p>  | <p>The Five-lined skink inhabits fields or open deciduous habitats where sufficient debris is available for cover and an open water source is nearby. In the Canadian Shield area, the skink is found in bare rocky outcrops and ridges with scattered shallow pockets of soil. Warm and moist microhabitats are used and sites below the frost line with good drainage are required for hibernation (ECCC 2017g)</p> | <p><b>Low</b> – the nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p>        |
| <p>Eastern Hog-nosed Snake<br/>(<i>Heterodon platirhinos</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S3<br/>Source: MNR (pers. comm. 2017)</p>   | <p>In the Georgian Bay region, this species prefers open grass, sand, human-impacted and forest habitats over rock, wetland, and aquatic habitats. Eastern Hog-nosed Snakes in shoreline areas often rely on driftwood and other ground cover in beach and beach dune habitats (COSEWIC 2007e).</p>   | <p><b>Low</b> – The nearby wetland complex may provide suitable habitat.</p>  |

**Environmental Effects Evaluation (EEE) Report**

| Species Name, Status (SARA <sup>1</sup> , ESA <sup>2</sup> , S-Rank <sup>3</sup> ), and Data Source <sup>4</sup>  | Preferred Habitat   | Potential for SAR Habitat/ Occurrence on the Site   |
|---|---|---|
| <p>Eastern Musk/Stinkpot Turtle<br/>(<i>Sternotherus odoratus</i>)</p> <p>SARA: Threatened<br/>ESA: Special Concern<br/>S-Rank: S3<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                        | <p>Prefers shallow water with a slow current and soft bottom. Inhabits rivers, lakes and ponds and will overwinter in these locations (ECCC 2017h).</p>   | <p><b>Low</b> – the nearby wetland complex provides suitable habitat but there is none within the proposed work area.</p>   |
| <p>Eastern Ribbonsnake<br/>(<i>Thamnophis sauritus</i>)</p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S3<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                              | <p>The Eastern Ribbonsnake is semi-aquatic and most frequently found along wetland edges. Quiet, shallow water with low surrounding cover is preferred, although areas with good exposure to sunlight are also required (Smith 2002).</p> | <p><b>Low</b> – The nearby wetland complex may provide suitable habitat.</p>  |
| <p>Gray Ratsnake<br/>(<i>Pantherophis spiloides</i>)<br/>Great Lakes – St. Lawrence population</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S3<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p> | <p>The Gray Ratsnake is semi-arboreal and generally associated with a wide range of woodland and scrub habitats. They generally inhabit a mosaic of forest and open habitat with a high edge to area ratio (COSEWIC 2007f).</p>           | <p><b>Low</b>- The nearby wetland complex and open fields may provide suitable habitat.</p>   |
| <p>Milksnake<br/>(<i>Lampropeltis Triangulum</i>)</p> <p>SARA: Special Concern<br/>ESA: No Status<br/>S-Rank: S3<br/>Source: CIMA (2015), ECCC (2017a)</p>  | <p>Use varied habitats but tend to use open habitats such as rocky outcrops, fields and forest edges. Overwinters underground, in rotting logs or building foundations (ECCC 2017i).</p>  | <p><b>Moderate</b> – the open grass area where Lot P1 will be constructed along with surrounding fields/open grassland/wetland complex outside of the work area may provide suitable habitat.</p> |
| <p>Northern Map Turtle<br/>(<i>Graptemys geographica</i>)</p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S3<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                            | <p>Inhabit slow-moving large rivers and lakes with a soft bottom. Habitat required that supports the female's mollusk prey (ECCC 2017j).</p>  | <p><b>Low</b> – the nearby wetland complex provides suitable habitat but there is none within the proposed work area.</p>   |
| <p>Snapping Turtle<br/>(<i>Chelydra serpentina</i>)</p> <p>SARA: Special Concern<br/>ESA: Special Concern<br/>S-Rank: S3<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                                  | <p>Slow-moving water with a soft mud bottom and dense aquatic vegetation usually in ponds, sloughs, shallow bays or river edges and slow streams and wetlands (COSEWIC 2008).</p>   | <p><b>Low</b> – the nearby wetland complex provides suitable habitat but there is none within the proposed work area.</p>   |

### **Environmental Effects Evaluation (EEE) Report**

| <b>Species Name, Status (SARA<sup>1</sup>, ESA<sup>2</sup>, S-Rank<sup>3</sup>), and Data Source<sup>4</sup></b>   | <b>Preferred Habitat</b>   | <b>Potential for SAR Habitat/ Occurrence on the Site</b>  |
|--|--|---|
| <p>Spiny Softshell<br/>(<i>Apalone spinifera</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S3<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                             | <p>Generally found in rivers with soft bottoms, aquatic vegetation and mudflats or sandbars. Found occasionally in lakes or impoundments also. Females nest in gravelly or sandy areas. Overwinter in deep water. Primarily aquatic and usually near water (ECCC 2017k).</p>   | <p><b>Low</b> – the nearby wetland complex provides suitable habitat but there is none within the proposed work area.</p> |
| <b>Mammals</b>   |  |   |
| <p>Grey Fox<br/>(<i>Urocyon cinereoargenteus</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S3<br/>Source: MNRF (2016d), ECCC (2017a)</p>  | <p>Generally live in/around deciduous forest. Den is usually located close to a water source in dense brush (MNRF 2016e).</p>  | <p><b>Low</b> – nearby wetland complex may provide suitable habitat but there is none within the proposed work area.</p>  |
| <b>Plants</b>  |  |   |
| <p>Blunt-lobed woodsia<br/>(<i>Woodsia obtuse</i>)</p> <p>SARA: Threatened<br/>ESA: Endangered<br/>S-Rank: S1<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                            | <p>Found on steep chalky rock faces or escarpments on the Precambrian shield. Sugar Maples, Oaks, White Ash and Ironwood are associated trees (MNRF 2015a, ECCC 2017l).</p>  | <p><b>None</b> – suitable habitat is not found within the proposed work area.</p>   |
| <p>Broad Beech Fern<br/>(<i>Phegopteris hexagonoptera</i>)</p> <p>SARA: Special Concern (Sch. 3)<br/>ESA: Special Concern<br/>S-Rank: S3<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p> | <p>Broad Beech Fern prefers rich, undisturbed deciduous forest, particularly mature Beech-maple forests. It is occasionally found in fresh to dry-fresh deciduous forests. It is typically found in moist areas, such as lower valley slopes, bottomlands and even swamps. It can be found in sunnier locations in mature forests but is primarily a shade-tolerant species which is unlikely to withstand major opening of the forest canopy (van Overbeeke et al. 2013).</p> | <p><b>None</b> – suitable habitat is not found within the proposed work area.</p>   |
| <p>Butternut<br/>(<i>Juglans cinerea</i>)</p> <p>SARA: Endangered<br/>ESA: Endangered<br/>S-Rank: S3?<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                                    | <p>Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges (MNRF 2015c).</p>  | <p><b>None</b> – suitable habitat is not found within the proposed work area.</p>   |
| <p>Purple Twayblade<br/>(<i>Liparis liliifolia</i>)</p> <p>SARA: Threatened<br/>ESA: Threatened<br/>S-Rank: S2<br/>Source: MNRF Frontenac Region (2016a), ECCC (2017a)</p>                           | <p>Found in varied habitats including deciduous swamp, shrub alvar, shrub thicket, deciduous forest, open oak woodland and savannah and conifer plantations. Grows in partial shade (MNRF 2015d, ECCC 2017m).</p>  | <p><b>None</b> – suitable habitat is not found within the proposed work area.</p>   |



## Environmental Effects Evaluation (EEE) Report

| Species Name, Status (SARA <sup>1</sup> , ESA <sup>2</sup> , S-Rank <sup>3</sup> ), and Data Source <sup>4</sup>  | Preferred Habitat  | Potential for SAR Habitat/ Occurrence on the Site                            |
|---|--|--|
| <b>Lichens</b>  |  |  |
| Pale-bellied Frost Lichen<br><i>(Physconia subpallida)</i><br><br>SARA: Endangered<br>ESA: Endangered<br>S-Rank: S1<br>Source: MNR Frontenac Region (2016a), ECCC (2017a) | Grow on bark of hardwood trees such as Ironwood, Black walnut, American elm and White ash. Also grows on fence posts and boulders (MNR 2015e). | <b>None</b> – No suitable habitat within proposed work area.                 |
| <b>Insects</b>  |  |  |
| Monarch Butterfly<br><i>(Danaus plexippus)</i><br><br>SARA: Special Concern<br>ESA: Special Concern<br>S-Rank: S1<br>Source: CIMA (2015)                                  | Inhabit areas with milkweed and wildflowers such as goldenrod and asters, such as abandoned farmland, open spaces, and roadsides (MNR 2017b).  | <b>Moderate</b> – milkweed is present along drainage feature east of Lot P7. |

Notes: <sup>1</sup> *Species at Risk Act*, 2002 Schedule 1 unless otherwise noted. The protection and/or conservation measures afforded by SARA apply only to species on Schedule 1.

<sup>2</sup> *Endangered Species Act*, 2007.

<sup>3</sup> S1 - Extremely rare throughout its range in the province; S2 - Rare throughout its range in the province; S3 - Uncommon or vulnerable species;

S4 - Apparently Secure Species; S5 - Secure Species; SX - Extirpated; B - Breeding; N - Non-breeding; ? - Uncertainty

<sup>4</sup> For simplicity, only regulatory agency record and PSPC provided background information sources have been listed here. However, many records are also found in range maps from the following sources: Atlas of the Breeding Birds of Ontario, Atlas of Mammals of Ontario, and Ontario Reptile and Amphibian Atlas.

<sup>5</sup> No current status under SARA. Ranked Not at Risk by COSEWIC.

<sup>6</sup> No current status under SARA. Not ranked by COSEWIC.

<sup>7</sup> No current status under SARA. Ranked Threatened by COSEWIC.

## **C.4 Socio-economic and Cultural Environment**

### **Land Use**

The Collins Bay Institution has been in operation since 1930 as a medium-security facility for male offenders. The Frontenac Institution opened as a minimum-security institution in 1976, in place of the Collins Bay Annex Farm. The Portsmouth Community Correctional Centre moved into the Phoenix Wing at the Frontenac Institution in 2009. Institution buildings include inmate housing and recreational grounds, pharmacy, maintenance building, roads/pathways, and parking areas.

The work area occurs immediately north and east of the of the perimeter wall. The work area north of the wall currently includes existing parking areas, perimeter road, and manicured lawn. The work area east of the wall currently includes parking areas, roads, pathways, and manicured lawn.

- North of the work area is a Bath Road with residential and commercial developments.
- East of the work area is manicured lawn with some buildings associated with the institutions. A wetland complex including a large waterbody surrounded by shrubs/trees and plants is present beyond the maintained institution grounds.
- South of the work area the Frontenac Institution buildings are present, including housing and administrative buildings. Farm fields are present south of the Frontenac Institution.
- West of the work area, north of the institutions, is manicured lawn with planted trees, eventually sloping downward into a creek.

Farming activities occur outside the work area, south and west of the perimeter wall, and several farm buildings are present. Pasture land and cropland are present. There is also a well present which is used to water vegetable gardens.

### **Archaeology and Cultural Heritage**

No buildings within the work area are designated heritage buildings. Institution Cell Block Building B-1 (inside perimeter wall), Northwest Tower Building D-4, Northeast Tower Building D-1, and Administrative Building A-1 are recognized as Federal Heritage Buildings due to their historical associations, architectural, and environmental values (Parks Canada n.d.). These buildings will not be affected by the proposed works associated with this EEE (Appendix A Figures 2 & 3).

Additionally, as per the CSC, August 2015 Project Brief (R1), the following landscape features with historical value are to be preserved:

- The small garden and cenotaph in front of the Collins Bay Main Entrance;
- The bench with plaque and garden in front of Frontenac Main Entrance; and
- The scenic tree-lined view of Collins Bay Institution from Bath Road.

## **C.5 Scoping**

This environmental effects evaluation considers the full range of project / environment interactions and the environmental factors that could be affected by the project as defined above and the significance of related effects after mitigation. The environmental effects of a project to be considered include at a minimum, but are not limited to, those described under subsection 5(1) and 5(2) of CEAA 2012.

## Environmental Effects Evaluation (EEE) Report

**Table 3: Potential Project / Environment Interactions Matrix**

| Project Phase /<br>Physical Work/Activity                                | As per Section 5(1)           |                        |                       | Section 5(1c)<br>Aboriginal Interest |                                |          |                   | Section 5(2)              |                                |                   | Due Diligence                          |                         |      |  |             |
|--|-------------------------------|------------------------|-----------------------|--------------------------------------|--------------------------------|----------|-------------------|---------------------------|--------------------------------|-------------------|--|-------------------------|------|--|-------------|
|  | Fish ( <i>Fisheries Act</i> ) | Aquatic Species (SARA) | Birds (MBCA and FWCA) | Health and Socio economic            | Physical and cultural heritage | Land use | HAPA Significance | Health and Socio economic | Physical and Cultural Heritage | HAPA Significance | Water (ground, surface, drainage, etc. | Birds / Wildlife (FWCA) | Soil | Terrestrial Species at Risk (SARA and ESA) | Air Quality |
| <b>Site Preparation</b>  |                               |                        |                       |                                      |                                |          |                   |                           |                                |                   |  |                         |      |  |             |
| ESC installation   | P                             | -                      | -                     | -                                    | -                              | -        | -                 | -                         | -                              | -                 | P                                      | P                       | -    | P  | -           |
| Establish lay-down areas   | P                             | -                      | P                     | -                                    | -                              | -        | -                 | -                         | -                              | -                 | P                                      | P                       | P    | P  | -           |
| <b>Construction Activities</b>   |                               |                        |                       |                                      |                                |          |                   |                           |                                |                   |  |                         |      |  |             |
| Asphalt removal from existing parking lot/roadway                        | P                             | -                      | -                     | -                                    | -                              | -        | -                 | P                         | -                              | P                 | P                                      | P                       | -    | P  | P           |
| Remove and replace watermain   | -                             | -                      | -                     | -                                    | -                              | -        | -                 | P                         | -                              | -                 | P                                      | P                       | P    | P  | P           |
| Clear vegetation and grade the area of the proposed expanded parking lot | P                             | -                      | P                     | -                                    | -                              | -        | -                 | P                         | -                              | -                 | P                                      | P                       | P    | P  | P           |
| Install asphalt parking areas  | P                             | -                      | -                     | -                                    | -                              | -        | -                 | P                         | -                              | P                 | P                                      | P                       | -    | P  | P           |
| Road/pathway construction  | P                             | -                      | -                     | -                                    | -                              | -        | -                 | P                         | -                              | P                 | P                                      | P                       | -    | P  | P           |
| Tree/shrub planting, grass rehabilitation                                | P                             | -                      | -                     | -                                    | -                              | -        | -                 | -                         | -                              | -                 | -                                      | -                       | -    | P  | -           |
| <b>Operation / Maintenance</b>   | -                             | -                      | P                     | -                                    | -                              | -        | -                 | -                         | -                              | -                 | P                                      | P                       | -    | P  | -           |

Notes: P = Potential Effect of Project on Environment; '-' = No Interaction

SARA = *Species at Risk Act, 2002*

MBCA = *Migratory Birds Convention Act, 1994*

FWCA = *Fish and Wildlife Conservation Act, 1997*

HAPA = Structure, site or thing that is of historical, archaeological, paleontological or architectural significance

ESA = *Endangered Species Act, 2007*

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**Table 4: Potential Project / Valued Ecosystem Interactions and Mitigation Measures (S.2(1))**

| <b>Valued Ecosystem Component - Fish (<i>Fisheries Act</i>)</b>   |   |
|---|---|
| <b>Potential Effect: Harmful effects to fish.</b>   |   |
| <b>Potential Interaction</b>  | <b>Mitigation</b>   |
| <p>Project activities may result in debris/material entering a nearby freshwater environment.</p> <p>Contamination of surface water from temporarily stored material during construction activities.</p> <p>Contamination/debris entering tributaries, stormwater areas which lead into Little Cataraqui Creek Wetland Complex.</p> | <ul style="list-style-type: none"> <li>• All waste materials must be disposed of in accordance with the applicable regulatory agency guidelines so as to mitigate potential effects generated by leachate entering the adjacent waters.</li> <li>• In the case that contaminated soils (identified by CIMA 2015) are to be excavated and disposed of, special management of these soils will not be required as laboratory reports have deemed the soils non-hazardous if disposed off-site (Dillon Consulting 2012).</li> <li>• If any construction debris/material, (e.g., plastic, food scraps, etc.) enter the aquatic environments they must be removed immediately and disposed of in accordance with the applicable regulatory agency guidelines.</li> <li>• Drainage from Lot P5 (Appendix A – Figure 3) construction should be effectively controlled through erosion and sediment control measures as specified below.</li> <li>• In the event dewatering is required within excavated watermain area, do not pump water containing suspended materials into waterways, sewers, drainage systems or any other areas of construction. The water should be pumped through a sediment removal system prior to discharge away from the project area. All chlorinated water discharged to the natural environment shall also be dechlorinated prior to release.</li> <li>• In order to control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements, an erosion and sediment control (ESC) plan should be developed by the Contractor to mitigate potential effects on water quality, and appropriate measures should be adopted to minimize any impacts of accidental spills during construction. The ESC Plan shall be in place prior to conducting work and should consider the following: <ul style="list-style-type: none"> <li>• ESC measures (e.g., temporary matting, geotextile filter fabric, etc.) are to be installed prior to construction to prevent erosion/runoff from impacting tributaries and wetland areas.</li> <li>• ESC measures are to be left in place until vegetation is re-established and/or all exposed soils are stabilized.</li> <li>• Inlet protection at all existing catch basins/storm drains/outfalls (not being immediately replaced) should be installed prior to the commencement of construction and will remain functional until construction completion.</li> <li>• Control measures should be inspected daily to ensure they are functioning and are maintained as required. If the control measures are not functioning properly, no further work will occur until the problem is fixed.</li> <li>• Restore disturbed areas as soon as possible to minimize the duration of soil exposure. Restoration should be to a pre-disturbed state or better.</li> </ul> </li> </ul> |

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|  |  |   |                          |                 |                                       |
|--|--|---|--------------------------|-----------------|---------------------------------------|
|  |  | <ul style="list-style-type: none"><li>• The exposed soil area must be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. All stockpiled soil must be covered and/or diked to prevent erosion and release of sediment laden water. Wherever possible, exposed soil is to be replanted or sodded to ensure soil stabilization.</li><li>• All activities including maintenance procedures should be controlled to prevent the entry of concrete, petroleum products, or other deleterious substances into the water.</li><li>• Machinery must undergo daily inspections, be checked for leakage and must be in good working order. Refuel, service and wash vehicles at a pre-designated location at least 30 m away from any water body and on an impermeable surface with a collection system.</li><li>• Basic spill control equipment must be on site at all times. All spills or leaks must be promptly contained, cleaned up and reported to the Ontario Spills Action Centre (1-800-260-6060). CSC’s Environmental reporting system, as outlined in the Internal Services Directive 318 (i.e. via form 1265-03 “Environmental Incident Report”) should also be followed as appropriate. Disposal of waste generated by a spill will be done in compliance with Ontario Waste Regulations at a Ministry of the Environment and Climate Change approved waste facility.</li><li>• A Spills Management and Emergency Response Plan will be developed by the Contractor and implemented as needed. All workers should be fully aware of the spill prevention and response procedures.</li></ul> |                          |                 |                                       |
| <b>Magnitude</b>   |  | <b>Reversibility</b>  | <b>Geographic Extent</b> | <b>Duration</b> | <b>Frequency</b>                      |
| Small  |  | Reversible  | Local                    | Short-term      | Once; during construction activities. |
| <b>Residual Effects:</b>   | Expected to be Insignificant with remote potential for sediment, dust, or contaminants entering adjacent waterbodies once mitigation measures are applied. |   |                          |                 |                                       |
| <b>Monitoring:</b>   | Required – ESC measures should be monitored daily and following any major rain event and repaired immediately as needed.                                   |   |                          |                 |                                       |
| <b>Comments:</b> Sedimentation and waste material generated during construction activities has the potential to negatively impact adjacent waters and fish/fish habitat. Such effects can be avoided through the application of effective mitigation measures. All drainage features within vicinity of the proposed work are to be treated as fish habitat. |  |   |                          |                 |                                       |

## **Environmental Effects Evaluation (EEE) Report**

| Valued Ecosystem Component – Birds (MBCA and FWCA)  |  |                   |            |                                  |
|---|--|-------------------|------------|----------------------------------|
| Potential Effect: Disturbance and loss of bird habitat.   |  |                   |            |                                  |
| Potential   | Mitigation   |                   |            |                                  |
| Project activities may result in temporary disturbance to birds during construction activities.<br><br>Impacts on birds due to vegetation clearing.<br><br>Delays in construction due to birds nesting within project footprint area.   | <ul style="list-style-type: none"><li>• All work is to be undertaken in compliance with the MBCA and the FWCA.</li><li>• Tree/shrub removal must not take place during the bird breeding season until fledglings have left parental territories, i.e., vegetation clearing is to be avoided from April 1 to August 28 (ECCC 2016).</li><li>• If vegetation removal is to be conducted between April 1 and August 28, a bird nest survey shall be conducted by a qualified avian biologist in the areas flagged for vegetation removal immediately (i.e., within 2 days) prior to commencement of the work to identify and locate active nests of species covered by the MBCA. If nests are observed, an adaptive mitigation plan (which may include establishing appropriate buffers around active nests) should then be developed to address any potential impacts on migratory birds or their active nests, and should be reviewed by ECCC prior to implementation.</li><li>• To minimize the potential for birds to nest within the project footprint during construction, the exposed wall of the excavated watermain trench should not be allowed to remain idle or exposed without activity for more than 48 hours during the bird nesting period (between April 1 and August 28). If areas of the trench are to be exposed without activity for more than 48 hours, the exposed excavation wall should be covered with tarping until work resumes in the area. Stockpiles soils should also be kept at a maximum height of 3 m, with the edges sloped at least 45 degrees to prevent nesting.</li><li>• Disturbances to all birds in and near the project area must be avoided as much as possible. If a bird protected under the MBCA is found to be using the construction area for breeding or nesting, the Contractor will halt work and contact ECCC for guidance prior to work commencing.</li><li>• Maintain machinery on regular basis to minimize construction noise and equipment emissions.</li><li>• Cover or wet down dry materials and rubbish to prevent blowing dust and debris.</li><li>• Proponents and Contractors must ensure that food scraps and garbage are not left at or near the project site.</li><li>• Ensure qualified workers operate machinery/equipment to reduce the chance of unintentional damage.</li><li>• Minimize sources of unnecessary noise or encroachment of worker activities in order to limit the extent of the project influence when possible.</li></ul> |                   |            |                                  |
| Magnitude   | Reversibility  | Geographic Extent | Duration   | Frequency                        |
| Small   | Reversible – Habitat disturbance.<br>Irreversible – Destruction of an active nest.   | Immediate         | Short-term | Once; during Project activities. |
| Residual Effects:   | Insignificant  |                   |            |                                  |
| Monitoring:   | Required – Check for wildlife prior to and during construction activities, including nest searches on the Materials Handling (ADGA) Building (Appendix A - Figure 2a) where swallows have been previously reported. Vegetation to be checked prior to removal. Follow MCBA, FWCA, and SAR legislation.   |                   |            |                                  |
| <b>Comments:</b> The duration of effects would be limited to the duration of construction activities. The potential exists for the disturbance of wildlife and birds due to an increase in noise and dust around the project site. Such effects are likely to be of short duration and confined to the project site and can be avoided through the application of effective mitigation measures. Minimal vegetation removal will occur, suitable vegetation will remain and additional tree and shrub plantings will occur. |  |                   |            |                                  |

## **Environmental Effects Evaluation (EEE) Report**

|   |   |  |            |                                  |
|---|---|--|------------|----------------------------------|
| Valued Ecosystem Component – Health and Socio Economic - Sections 5(1) and 5(2)   |   |  |            |                                  |
| Potential Effect: Disturbance to communities.   |   |  |            |                                  |
| Potential Interaction   |   | Mitigation   |            |                                  |
| Persons present on or surrounding the Project site may be exposed to hazards.<br><br>Operation of the site may cause exposure to hazardous materials.   |   | <ul style="list-style-type: none"><li>• The Contractor shall prepare a waste management plan to deal with non-hazardous waste.</li><li>• Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labeling and provision of MSDS acceptable to Labour Canada.</li><li>• Activities must be conducted by qualified contractor to meet Health Canada regulations.</li><li>• Post signage in appropriate areas to identify risks/hazards and required personal protective equipment.</li><li>• Workers who may come in contact with hazards must be provided with and use appropriate personal protective equipment.</li><li>• Site access must be restricted to authorized workers only. Signs should be posted where applicable.</li><li>• Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Dust suppression measures must be applied to prevent fugitive dust.</li><li>• Workers should be notified that construction activities in the area may encounter impacted soils and exposure is only expected to occur for the construction worker via incidental ingestions.</li></ul> |            |                                  |
| Magnitude   | Reversibility   | Geographic Extent  | Duration   | Frequency                        |
| Small   | Reversible  | Immediate  | Short-Term | Once; during Project activities. |
| Residual Effects:   | Insignificant   |  |            |                                  |
| Monitoring:   | Required – contractor to ensure staff are properly trained and monitor work to ensure safe work practices to mitigate possible affects. |  |            |                                  |
| Comments: While workers may be exposed to hazards, the exposure can be limited through the use of appropriate personal protective equipment and restricting site access to authorized workers only. In addition, workers must follow the provincial <i>Occupational Health and Safety Act, 1990</i> and any other appropriate legislation, regulations, guidelines, or best-management practices. |   |  |            |                                  |

**Environmental Effects Evaluation (EEE) Report**

|   |               |   |             |                                       |
|---|---------------|---|-------------|---------------------------------------|
| Valued Ecosystem Component – HAPA Significance  |               |   |             |                                       |
| Potential Effect: Damage to Feature   |               |   |             |                                       |
| Potential Interaction   |               | Mitigation  |             |                                       |
| Accidental damage to structure of cultural/heritage significance (e.g. northeast tower, cenotaph area).                                       |               | <ul style="list-style-type: none"><li>• Work and travel in designated areas.</li><li>• Provide avoidance signage on significant heritage structures during construction.</li><li>• Ensure all workers are aware that significant features are not to be disturbed.</li><li>• Ensure qualified workers operate machinery/equipment to reduce the chance of unintentional damage.</li></ul> |             |                                       |
| Magnitude   | Reversibility | Geographic Extent   | Duration    | Frequency                             |
| Small   | Irreversible  | Immediate   | Medium-Term | Once; during construction activities. |
| Residual Effects:   |               | Insignificant   |             |                                       |
| Monitoring:   |               | None required   |             |                                       |
| Comments: Areas of cultural, historical, etc. significance have been identified and all workers must take precautions to protect these areas. |               |   |             |                                       |



## **Environmental Effects Evaluation (EEE) Report**

| Valued Ecosystem Component – Water  |  |   |            |                                  |
|---|--|---|------------|----------------------------------|
| Potential Effect: Groundwater and/or surface water contamination.   |  |   |            |                                  |
| Potential Interaction   |  | Mitigation  |            |                                  |
| Contamination of groundwater, drainage features, and/or the adjacent wetland complex during construction and operations through accidental spills.<br><br>During construction and operation activities, there is potential for debris and other materials (e.g. concrete, petroleum products, or other deleterious substances) to enter drainage features and ultimately enter into the adjacent wetland complex. |  | <ul style="list-style-type: none"><li>• Apply mitigation measures as per the “Fish (Fisheries Act)” valued ecosystem component.</li><li>• Ensure site drainage conditions are accounted for in site development plans.</li><li>• Provide and maintain temporary drainage ditches and other diversions outside of excavation limits, as required, to keep excavations free of water while work is in progress and to protect open excavations against flooding and damage due to surface run-off.</li><li>• Be aware of the recently decommissioned and active monitoring wells located throughout the project area. It is recommended that all groundwater monitoring wells throughout the project site be decommissioned at the onset of this project.</li></ul> |            |                                  |
| Magnitude   | Reversibility  | Geographic Extent   | Duration   | Frequency                        |
| Small   | Reversible   | Local   | Short-Term | Once; during Project activities. |
| Residual Effects:   | Expected to be Insignificant with remote potential for sediment, dust, or contaminants entering adjacent waterbodies once mitigation measures are applied. |   |            |                                  |
| Monitoring:   | Required - ESC measures should be monitored daily and following any major rain event and repaired immediately as needed.                                   |   |            |                                  |
| Comments: No significant effect on water quality expected. Residual effects could be significant due to ongoing use of the area with vehicles.  |  |   |            |                                  |

### **Environmental Effects Evaluation (EEE) Report**

|   |   |  |   |                                  |
|---|---|--|---|----------------------------------|
| <b>Valued Ecosystem Component</b> – Birds (not protected under the MBCA), Wildlife, and their Habitat (FWCA)  |   |  |   |                                  |
| <b>Potential Effect:</b> Temporary habitat loss and disturbance, and potential accidental mortality due to Project activities.  |   |  |   |                                  |
| <b>Potential Interaction</b>  |   | <b>Mitigation</b>  |   |                                  |
| Project activities include the removal of vegetation resulting in temporary loss of habitat.<br><br>Wildlife may also be disturbed by construction activities (i.e., generation of noise and dust).   |   | <ul style="list-style-type: none"><li>• Ensure all workers are aware of which vegetation remains and protect trees/shrubs adjacent to work areas from damage by wrapping them in burlap and/or encasing them with protective wood framework or tree hoarding (snow fence).</li><li>• Protect roots of designated trees during construction to prevent disturbance or damage. Avoid unnecessary traffic, dumping, and storage of materials over root zones (e.g., under tree driplines). Minimize stripping of topsoil and vegetation. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.</li><li>• Should wildlife (mammals, reptiles, amphibians, birds, etc.) be encountered at any time during the project, measures are to be implemented to avoid destruction, injury, or interference with the species (such as temporary ceasing work which would pose immediate threat and then waiting for the individual to flee the site for alternative cover).</li><li>• Maintain machinery on regular basis to minimize construction noise and equipment emissions.</li><li>• Minimize the frequency of dust-generating construction activities during prolonged periods of dry weather.</li><li>• Employ measures to minimize dust generation during work activities.</li><li>• Proponents and Contractors must ensure that food scraps and garbage are not left at or near the Project site.</li><li>• Disturbances to all wildlife in and near the project area must be avoided as much as possible.</li><li>• Minimize duration and extent of disturbance to existing vegetation and natural areas serving as habitat.</li><li>• Minimize sources of unnecessary noise or encroachment of worker activities in order to limit the extent of the project influence when possible.</li></ul> |   |                                  |
| <b>Magnitude</b>  | <b>Reversibility</b>  | <b>Geographic Extent</b>   | <b>Duration</b>   | <b>Frequency</b>                 |
| Small   | Habitat disturbance is Reversible.<br>Destruction of an active nest/den is Irreversible.                                    | Immediate  | Disturbance of ground cover will be a Short-Term impact as all disturbed areas will be seeded after completion.<br>Destruction of trees will be a Long-Term impact as it will take many years for similar habitat to be restored. | Once; during Project activities. |
| <b>Residual Effects:</b>  | Insignificant – similar suitable habitat is available nearby and other impacts will be temporary during project activities. |  |   |                                  |
| <b>Monitoring:</b>  | None.   |  |   |                                  |
| <b>Comments:</b> The potential exists for the disturbance of wildlife and birds due to an increase in noise and dust around the Project site. Such effects are likely to be of short duration and confined to the Project site and can be avoided through the application of effective mitigation measures. |   |  |   |                                  |

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| Valued Ecosystem Component – Soil  |  |  |                   |            |                                       |
|--|--|--|-------------------|------------|---------------------------------------|
| Potential Effect: Erosion and contamination of soils.  |  |  |                   |            |                                       |
| Potential Interaction  |  | Mitigation   |                   |            |                                       |
| On-site soil erosion/disturbance due to vegetation removal and use of heavy equipment and trenching.<br><br>Potential soil contamination from spills.  |  | <ul style="list-style-type: none"><li>• Prevent contamination of access roads. Immediately scrape up debris or material on access roads which is suspected to be contaminated; transport and place into designated area.</li><li>• Excess or stockpiled soil must be stored on site for the shortest time possible, remain covered, and be disposed of at an approved facility in accordance with the applicable regulatory agency guidelines.</li><li>• Debris and waste materials should likewise be stored on site for the shortest time possible, remain covered, and be disposed of at an approved facility in accordance with the applicable regulatory agency guidelines.</li><li>• Work should be scheduled to avoid periods of heavy precipitation. ESC measures (e.g., temporary matting, geotextile filter fabric, etc.) are to be used, as appropriate, to prevent erosion and release of sediments and/or sediment laden water during the construction phase. These structures are to be left in place until vegetation is re-established and/or all exposed soils are stabilized.</li><li>• Cut-and-cover construction should be supported by sheeting and shoring or use of a trench box, as appropriate, to prevent soils from eroding and slumping into the trench and to maintain a narrow construction corridor.</li><li>• Keep excavations clean, free of standing water, and loose soil. Where soil is subject to significant volume change due to change in moisture content, cover and protect to Department Representative's approval.</li><li>• To protect trench excavation from soil erosion, do not excavate more than 30 m of trench in advance of watermain installation operations and do not leave open more than 15 m at end of day's operation, unless otherwise authorized by Department Representative in writing. Trench segments should be excavated and closed promptly, minimizing the time that trenches are open. The trench should be backfilled with clean fill or re-filled with excavated soils, if deemed suitable (uncontaminated). Do not mix topsoil with subsoil for excavated soils to be reused on site.</li><li>• Exposed soil areas must be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. All stockpiled soil should be covered and/or diked as feasible to prevent erosion and release of sediment laden water.</li><li>• Basic petroleum spill clean-up equipment must be on site at all times. All spills or leaks must be promptly contained, cleaned up, and reported to Ontario Spills Action Centre at 1-800-268-6060.</li></ul> |                   |            |                                       |
| Magnitude  |  | Reversibility  | Geographic Extent | Duration   | Frequency                             |
| Small  |  | Reversible   | Immediate         | Short-term | Once; during construction activities. |
| Residual Effects:  |  | Insignificant  |                   |            |                                       |
| Monitoring:  |  | None required  |                   |            |                                       |
| <b>Comments:</b> Construction activities could result in the mobilization of on-site soils, especially during precipitation events. Such runoff events are likely to be of short duration and confined to the Project site. The implementation of effective mitigation measures can reduce such effects to insignificant levels. |  |  |                   |            |                                       |

## **Environmental Effects Evaluation (EEE) Report**

| Valued Ecosystem Component – Terrestrial SAR and their Habitat (SARA and ESA)   |  |   |   |                                  |
|---|--|---|---|----------------------------------|
| Potential Effect: Potential impacts or accidental mortality due to Project activities.  |  |   |   |                                  |
| Potential Interaction   |  | Mitigation  |   |                                  |
| <p>Project activities include the removal of vegetation resulting in temporary loss of habitat.</p> <p>Species at Risk, if present, may also be disturbed by construction activities (i.e., generation of noise and dust).</p>  |  | <ul style="list-style-type: none"><li>• Develop a protocol for Species at Risk encounters.</li><li>• Employ measures to minimize dust generation during work activities.</li><li>• Proponents and Contractors must ensure that food scraps and garbage are not left at or near the project site.</li><li>• Should any SARA- or ESA-protected species, or its habitat (e.g., snake hibernacula) be encountered at any time during the Project, measures are to be implemented to avoid destruction, injury, or interference with the species, its residence and/or its habitat (e.g., through siting, timing, or design changes). Work shall cease and the Project Manager should contact the Departmental Representative and ECCC (see Part A for contact information) for advice on how to proceed and MNRF for notification of the sighting.</li><li>• If an injured/deceased SAR is found, the specimen should be placed in a non-airtight, fully labelled container and kept at a temperature so as to not worsen its condition. For additional guidance, MNRF and ECCC staff must be contacted immediately (see Part A for contact information).</li><li>• All work is to be undertaken in compliance with the Species at Risk Act, 2002 and the Endangered Species Act, 2007.</li><li>• In order to minimize the potential for incidental disturbance to protected birds, vegetation clearing and any proposed work activities should be undertaken outside of the regional nesting period (April 1 through August 28).</li><li>• If works are to be conducted during the regional nesting period, a bird nest survey shall be conducted by a qualified avian biologist in the areas flagged for vegetation removal immediately (i.e., within 2 days) prior to commencement of the work to identify and locate active nests of species covered by SARA and/or the ESA. If nests are observed, an adaptive mitigation plan (which may include establishing appropriate buffers around active nests) should then be developed to address any potential impacts on protected birds or their active nests, and should be reviewed by the appropriate agency (ECCC or MNRF) prior to implementation.</li><li>• Confine construction equipment/vehicles to the access roads and project area to minimize impacts to vegetation.</li></ul> |   |                                  |
| Magnitude   | Reversibility  | Geographic Extent   | Duration  | Frequency                        |
| Small   | Habitat disturbance is Reversible. Destruction of an active nest or hibernaculum is Irreversible | Immediate   | Disturbance of ground cover vegetation will be a Short-Term impact as all disturbed, unpaved areas should be seeded after completion.<br>Destruction of trees will be a Long-Term impact as it will take many years for similar habitat to be restored. | Once; during Project activities. |
| Residual Effects:   |  | Expected to be Insignificant as similar suitable habitat is available nearby and other impacts will be temporary during project activities.   |   |                                  |
| Monitoring:   |  | None.   |   |                                  |
| Comments: The potential exists for the disturbance of SAR due to an increase in noise and dust around the Project site. Such effects are likely to be of short duration and confined to the Project site and can be avoided through the application of effective mitigation measures. |  |   |   |                                  |

## Environmental Effects Evaluation (EEE) Report

| Valued Ecosystem Component – Air Quality   |               |   |             |                                       |
|--|---------------|---|-------------|---------------------------------------|
| Potential Effect: Reduced Air Quality  |               |   |             |                                       |
| Potential Interaction  |               | Mitigation  |             |                                       |
| <p>Potential for fumes and air emissions from construction materials and vehicle/machinery to degrade air quality during all construction-related activities.</p> <p>Impacts to air quality and human health due to release of dust, soil, and airborne particles.</p>                 |               | <ul style="list-style-type: none"><li>• Vehicles/machinery to be in good repair, equipped with emission controls as applicable and operated within regulatory requirements.</li><li>• Comply with operating specifications for heavy equipment and machinery.</li><li>• Vehicles and machinery should not be left idling while not in use.</li><li>• Minimize vehicle traffic on exposed soils.</li><li>• Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.</li><li>• Soils will only be transported in secure holdings to limit loss of soils as dust.</li><li>• Stabilize areas of stockpiled or exposed soils using tarps or other similar covers.</li><li>• Avoid activities with the potential to release airborne particles during windy and prolonged dry periods.</li><li>• Keep the main entrance road clear of any mud or earth tracked from vehicles.</li><li>• Keep asphalt surfaces clean of debris resulting from removal operations.</li><li>• Workers to wear protective gear (e.g., safety work boots, respirators, hard hats, etc.) in accordance with the <i>Occupational Health and Safety Act, 1990</i> (OHSA) and regulations.</li><li>• Work shall be carried out in compliance with the <i>Canadian Environmental Protection Act, 1999</i> (CEPA), and applicable air emission regulations and by-laws.</li></ul> |             |                                       |
| Magnitude  | Reversibility | Geographic Extent   | Duration    | Frequency                             |
| Small  | Irreversible  | Immediate   | Medium-Term | Once; during construction activities. |
| Residual Effects:  | Insignificant |   |             |                                       |
| Monitoring:  | None required |   |             |                                       |
| <b>Comments:</b> Air quality degradation limited to duration of construction activities and would occur intermittently based on construction activities. If no mitigation measures taken, workers will be exposed regularly to reduced air quality during all construction activities. |               |   |             |                                       |

## **PART D: COMMUNICATIONS**

### **D.1 Consideration of Public Concerns**

PSPC evaluated the Project at Collins Bay and Frontenac Institutions in the Preliminary Identification of Environmental Services Required (PIESR) and determined there was no potential for public concern.

### **D.2 Aboriginal Interest**

PSPC evaluated the Project at Collins Bay and Frontenac Institutions in the PIESR and determined that no aboriginal consultation is required. PSPC/CSC must continue to ensure the Crown's duty to consult with respect to crown conduct that may potentially have an adverse impact on established or potential Aboriginal or Treaty rights, as recognized and affirmed under section 35 of the *Constitution Act, 1982* is undertaken.

### **D.3 Government Co-ordination**

CSC is proposing the Project on federal land and does not require any environmental licenses or permits from other provincial/municipal agencies. However, to assist with Species at Risk information, Amec Foster Wheeler contacted the MNRF during the course of the environmental effects evaluation. A project description was provided to this provincial authority in order to garner information on potential presence of Species at Risk. Applicable information has been included herein and MNRF correspondence is provided in Appendix B.

## **PART E: ENVIRONMENTAL EFFECTS EVALUATION CONCLUSION**

Potential impacts of this project are associated with Air Quality, Soil, Surface and Groundwater Quality, the *Fisheries Act*, Birds, Wildlife, Terrestrial Species at Risk and structures of cultural/heritage concern. It is reasonable to conclude that with appropriate mitigation in place and good work practices, environmental effects will be insignificant, short in duration, and the potential zone of influence will be confined to the immediate vicinity.

## **PART F: ACCURACY AND COMPLIANCE MONITORING**

Site monitoring (accuracy and compliance monitoring) for this project should be completed to ensure mitigation measures are in place and effective in preventing adverse environmental effects.

## **Environmental Effects Evaluation (EEE) Report**

### **PART G: DETERMINATION**

The Federal Authority is required to provide a determination of the significance of environmental effects as a result of this project. The decision outlined below is based on the interpretation of environmental effects and mitigation measures described in Part D of this report.

**Project Name:** Site Development and Parking Lot Expansion at Collins Bay and Frontenac Institutions  
**PSPC Project #:** R.079099.001  
**Location:** Kingston, Ontario

The Federal Authority has evaluated the project for significant adverse environmental effects as required under Section 67 of *Canadian Environmental Assessment Act, 2012* (CEAA). On the basis of this evaluation, the department has determined that the decision opposite the "X" applies to the proposed project.

- Project not likely to cause significant adverse environmental effects - proceed.
- Project not likely to cause significant adverse environmental effects with mitigation - proceed using mitigative measures as determined.
- Inadequate information available - further study and assessment is required.
- Project likely to cause significant adverse environmental effects that cannot be justified in the circumstances - project will not proceed.
- Project likely to cause significant adverse environmental effects that may be justified in the circumstances - refer to the Governor in Council for decision.

## Environmental Effects Evaluation (EEE) Report

### PART H: SIGNATURE


This document summarizes the results of an environmental effects evaluation related to the above project that has been performed and completed by the Federal Authority in accordance with the *Canadian Environmental Assessment Act, 2012*.

Written by:  Date: March 21, 2018  
Roxanne Dibbley, Biologist, Amec Foster Wheeler Environment & Infrastructure

Reviewed by:  Date: March 21, 2018  
Jeff Balsdon, Senior Environmental Ecologist, Amec Foster Wheeler Environment & Infrastructure

*The above has completed this environmental effects evaluation (EEE) report to the best of their ability and knowledge, and ensures that it meets the requirement of the Canadian Environmental Assessment Act, 2012.*

Approved by:  Date: 28 March 2018  
Yash Kodai, Project Manager, Real Property Branch, Public Services and Procurement Canada

Approved by:  Date: 2018-03-28  
Paul Provost, Director, Environment, Correctional Services Canada

*The above has read and understood this environmental effects evaluation (EEE) report and acknowledges responsibility for ensuring the implementation of mitigation measures and for ensuring the design and implementation of 'accuracy and compliance monitoring', if any, identified in this report.*



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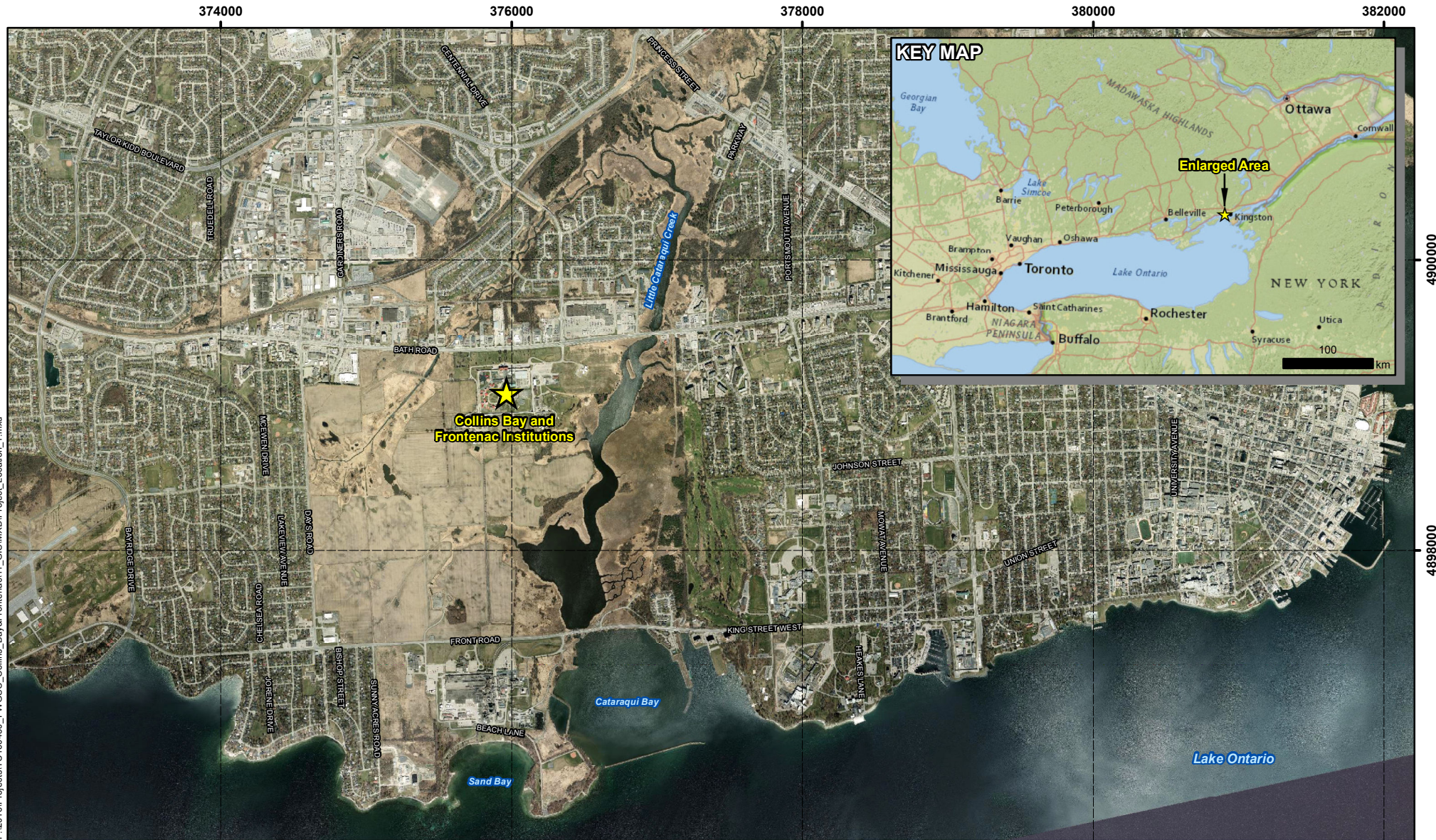
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
## **Environmental Effects Evaluation (EEE) Report**

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**APPENDIX A**  
**FIGURES**

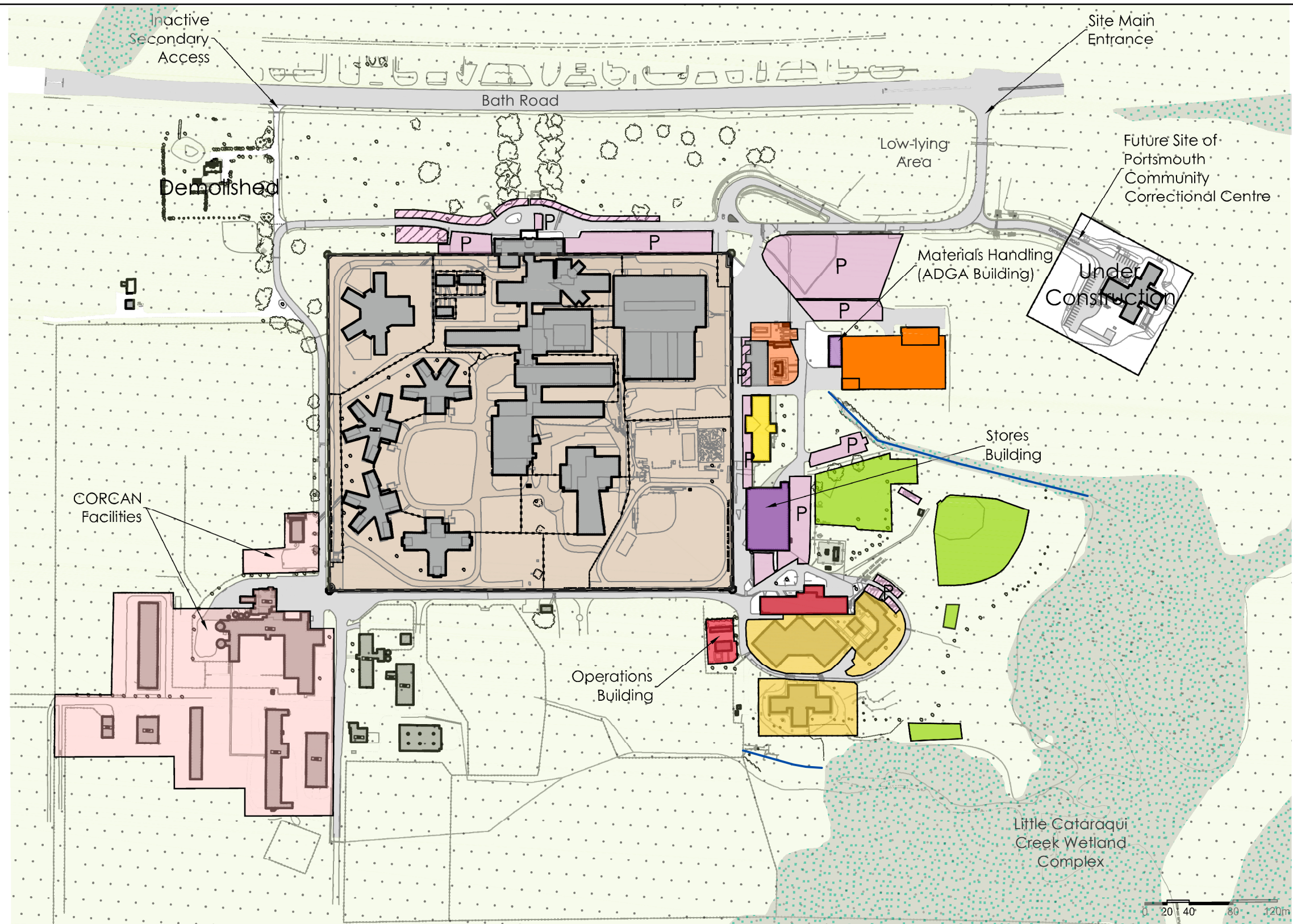




|  |  |   |  |
|--|--|---|--|
| <p><b>LEGEND</b></p> <p>★ Site Location</p>  | <p><b>NOTES:</b></p> <p>- Background imagery extracted from ESRI, 2015</p>                   | <p> Public Works and Government Services Canada</p> <p></p> |  |
| <p><b>ENVIRONMENTAL EFFECTS EVALUATION REPORT FOR SITE DEVELOPMENT AND PARKING LOT EXPANSION AT COLLINS BAY AND FRONTENAC INSTITUTIONS</b></p> |  |   |  |
| <p><b>Project Location</b></p>   |  |   |  |
| <p>Datum: NAD83<br/>Projection: UTM Zone 18N</p> <p>0 0.5 1 2 3 4 5 Kilometres</p>   | <p></p> | <p>PROJECT N°: TC160430</p> <p>SCALE: 1:37,000</p>  | <p><b>FIGURE: 1</b></p> <p>DATE: February 2017</p> |



P:\2016\Projects\TC160430 - PWGSC Collins Bay & Frontenac\11 GIS\MXD\Existing Land Use 2.mxd



#### LEGEND

|                               |   |                  |
|-------------------------------|---|------------------|
| Administrative / Visitor Area | Materials Handling                        | Drainage Feature |
| Open Space / Agricultural     | Operations (Heating, Water, Sewage, Fuel) |                  |
| Designated Parking lots       | CORCAN Facilities                         |                  |
| Informal Parking Area         | Pharmacy                                  |                  |
| Medium Security Institution   | Regional Garage                           |                  |
| Minimum Security Residential  | Provincially Significant Wetland          |                  |
| Recreational (Park Green)     |   |                  |

NOTES:  
- Design Concept Plan was provided by Public Works and Government Services Canada.

Datum: NAD83  
Projection: UTM Zone 18N



#### ENVIRONMENTAL EFFECTS EVALUATION REPORT FOR SITE DEVELOPMENT AND PARKING LOT EXPANSION AT COLLINS BAY AND FRONTENAC INSTITUTIONS

#### Existing Land Use

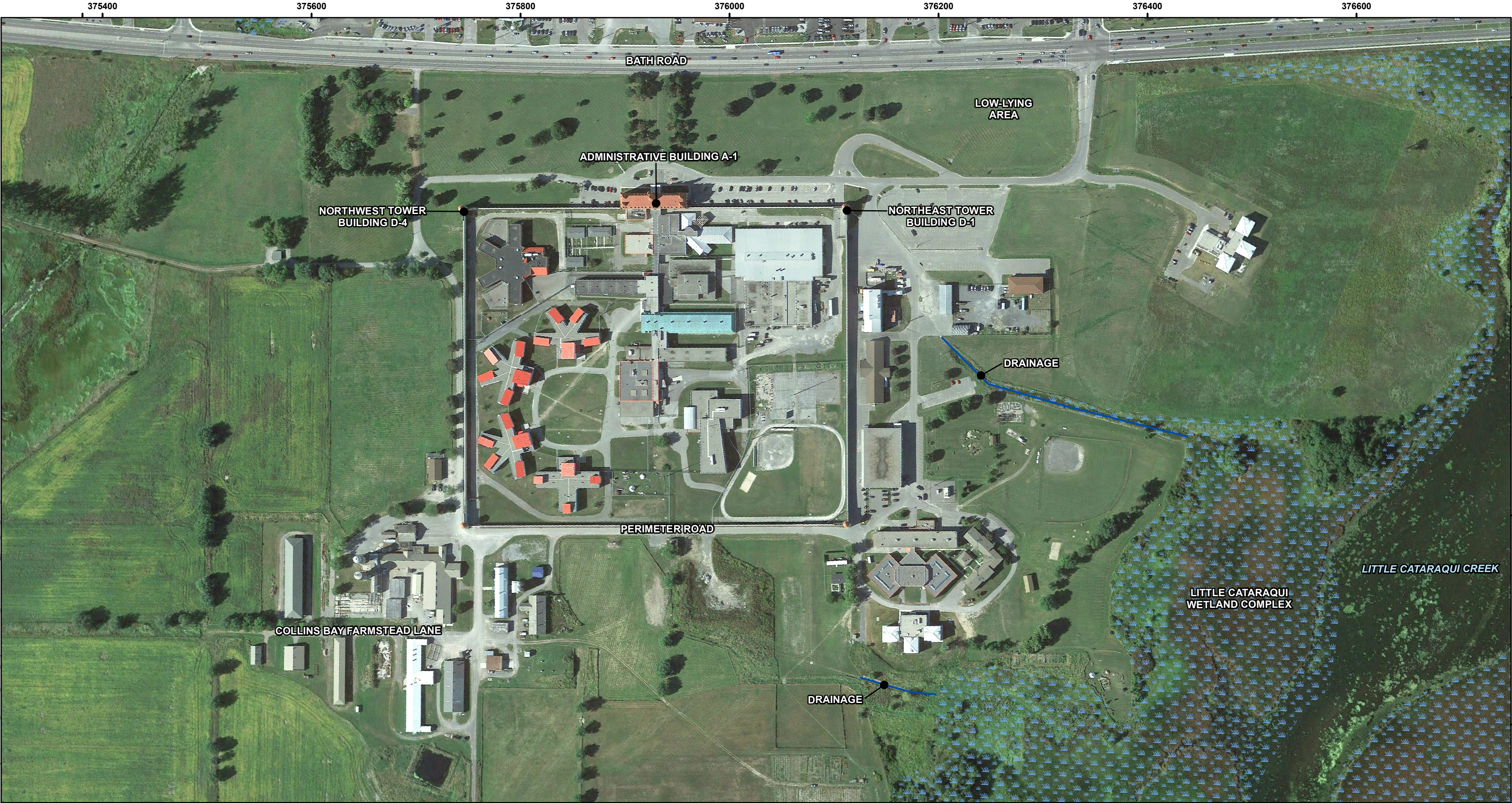
PROJECT N°: TC160430

SCALE: AS SHOWN

FIGURE: 2a

DATE: February 2017





**LEGEND**

Drainage Features

Provincially Significant Wetland

NOTES:  
- Imagery extracted from Google Earth Pro., Sept 2015

Public Works and Government Services Canada

ENVIRONMENTAL EFFECTS EVALUATION REPORT FOR  
SITE DEVELOPMENT AND PARKING LOT EXPANSION  
AT COLLINS BAY AND FRONTENAC INSTITUTIONS

Existing Land Use

Datum: NAD83  
Projection: UTM Zone 18N

PROJECT N°: TC160430

FIGURE: 2b

SCALE: 1:3,500

DATE: February 2017

050100200300400500

Metres

P:\2016\Projects\TC160430 - PWGSC - Collins Bay\Frontenac11 GIS\MXD\Existing Land Use Aerial 1.mxd





**APPENDIX B**  
**MNRF CORRESPONDENCE**

## Hellinga, Erin

---

**From:** Li, Jenny (MNRF) <Jenny.Li2@ontario.ca>  
**Sent:** May-25-17 4:29 PM  
**To:** Dibbley, Roxanne  
**Cc:** Warren, Catherine (MNRF)  
**Subject:** 2015-05-25 MNRF Comments 17-000-KNG-INF-2468 FW: Species at Risk Information Request  
**Attachments:** BW\_Little Cataraqui Creek Complex.pdf; Individual Wetland Summary.pdf

Hello Roxanne,

MNRF Peterborough District has received your email (dated Jan 10, 2017) regarding the Species at Risk Information request with respect to the project area located at Collis Bay and Frontenac Bay Institutions, City of Kingston. We provide the following general information for your consideration:

### **General: MNRF Data and Information**

We would like to inform you that MNRF's natural heritage and natural resources data and information (including wetlands, ANSIs) for the study area can be obtained through the Land Information Ontario Warehouse (LIOW) through the Ministry's Land Information Ontario (LIO) website at: <https://www.ontario.ca/environment-and-energy/land-information-ontario>.

You may also view natural heritage information online (e.g. Provincially Significant Wetlands, ANSIs, Woodlands, NHIC 1 km screening squares) using Natural Heritage Make a Map at: <https://www.ontario.ca/environment-and-energy/make-natural-heritage-area-map>.

You can also obtain Species at Risk occurrence information on our Natural Heritage Information Centre website: <https://www.ontario.ca/environment-and-energy/get-natural-heritage-information>. In addition, the official Species at Risk in Ontario (SARO) List can be obtained at: [http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_080230\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080230_e.htm)

We recommend that you use the above-noted sources of information during the review of your project proposal.

### **Wetlands**

The subject property is adjacent to a Provincially Significant Wetland, which is the Little Cataraqui Creek Complex. The wetland map and evaluation report is attached in this email. We recommend contacting your local Conservation Authority for more information on approvals that may be required.

### **ANSIs**

There are no Areas of Natural and Scientific Interests on or adjacent to the subject's project site.

### **Species at Risk**

A review of our best available information indicates that there are occurrences of Barn Swallow (Threatened), Black Tern (Special Concern), Chimney Swift (Threatened) and King Rail (Endangered) in the immediate area of the site. Also, there are occurrences of American Eel (Endangered), Bank Swallow (Threatened), Barn Owl (Endangered), Blanding's Turtle (Threatened), Bobolink (Threatened), Bowman's Root (Threatened), Common Nighthawk (Special Concern), Eastern Hog-Nosed Snake (Threatened), Eastern Meadowlark (Threatened), Eastern Wood-Pewee (Special Concern), Gray Ratsnake Frontenac Axis Population (Threatened), Lake Sturgeon Gt Lakes Upper St. Lawrence River Pop (Threatened), Least Bittern (Threatened), Monarch (Special Concern), Northern Bobwhite (Endangered), Peregrine Falcon (Special Concern), Red-Headed Woodpecker (Special Concern), Snapping Turtle (Special Concern), Spiny Softshell (Threatened) and Wood Thrush (Special Concern) in the general area (5 km) of the proposed activities. Although no other threatened or endangered species or their habitat have been documented in the area of the proposed projects, these features may be present and this list should not be considered complete.

Species listed as endangered or threatened on the Species at Risk in Ontario (SARO) list are protected under the Endangered Species Act, 2007 (ESA). Section 9(1) of the ESA prohibits a person from killing, harming, harassing, capturing or taking a member of a species listed as endangered, threatened or extirpated on the SARO list. Section 10(1) of the ESA prohibits the damage or destruction of habitat of a species listed as endangered or threatened on the SARO list.

**Since comprehensive mapping for most Species at Risk is not available, a site assessment is recommended** to identify the presence of any Species at Risk and/or their habitat on the subject lands, as a decision should not be made in the absence of such information. The focus of the site assessment can include a review of the information about known occurrences provided by MNRF above along with other information sources such as species distributions and habitat requirements as well as field visits using MNRF approved protocols during the appropriate seasons by a qualified professional. Due to the species that are potentially present at this site, the following recommendations should help prevent adverse impacts:

#### Birds

Workers must be vigilant and check work areas for the presence of breeding birds and nests containing eggs and/or young. If breeding birds and/or nests are encountered, works should not continue in the location of the nest until after August 1 (or as soon as it has been determined that the young have left the nest). Please note that the breeding bird season in the subject area extends from April 15 to July 31.

*Specific Barn Swallow Information:* Barn Swallow nests may be present under bridges and/or culverts. Therefore, the underside of these structures should be assessed for Barn Swallow nests before proceeding. If no nests are present, a contravention of the ESA is unlikely. However, if nests are present, construction should not begin until after August 15 of any year. If nests will be impacted during the nesting season or if the structure will no longer be suitable for nesting post-construction, ESA requirements will apply to the activity. A regulatory provision is available that allows eligible activities that impact to Barn Swallow to register and follow all the rules in regulation in place of applying for a permit under the ESA. See this website for more information on regulatory requirements for Barn Swallow:

<https://www.ontario.ca/page/alter-structure-habitat-barn-swallow>.

#### Turtles and Snakes

Workers must be vigilant and check work areas for the presence of turtles. If turtles or snakes are encountered, whenever possible, work should be temporarily suspended until the animal is out of harm's way. Workers should report any turtle observations (including photographs and coordinates) to the Peterborough District Office immediately at (705) 755-2001. Please note that the turtle nesting season in the subject area extends from May 15 to Aug 15. Therefore, activities which may cause adverse impacts to a species or habitat (e.g. use of heavy equipment) should commence after Aug 15.

As of July 1, 2013, there are new regulatory provisions provided under the ESA. This regulatory provision allows eligible activities, such as work undertaken to repair, modify, demolish, replace or general maintenance of a structure or the removal of buildings and/or excavation of land, vegetation removal, etc. that is considered to be species at risk habitat to proceed without a permit, provided the proponent register with the Ministry of Natural Resources and Forestry and then follow the specific rules in regulation under the ESA. These rules include, but are not limited to, preparing a mitigation plan and implementing steps to minimize the adverse effects of the activity on the species identified.

Information on the new ESA regulatory provision that come into effect on July 1, 2013 can be found at <http://www.ontario.ca/environment-and-energy/natural-resources-approvals>.

The amended ESA regulation (O.Reg 242/08) can be found at [http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_080242\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm).

If an impact to a Species at Risk or its habitat cannot be avoided, a person(s) should contact MNRF to discuss options, including applying for an authorization under the ESA. In situations where an activity is not registered with or authorized by the MNRF, a person(s) must comply with the ESA by modifying proposed activities to avoid impacts to Species at Risk and habitat protected under the ESA.

It is highly recommended that landowners and on-site workers familiarize themselves with information found at the following link:

MNRF Species at Risk website: [www.ontario.ca/speciesatrisk](http://www.ontario.ca/speciesatrisk)

During on-site activities, should any species at risk or their habitat be potentially impacted, MNRF should be contacted immediately and operations should be modified to avoid any negative impacts to species at risk or their habitat until further discussions with MNRF can occur regarding opportunities for mitigation. If any species at risk are found, the Peterborough District MNRF office should be contacted at 705-755-2001. If possible, pictures of the species at risk and coordinates for the location where it was observed should be provided to MNRF.

#### **Significant Wildlife Habitat**

The site may contain significant wildlife habitat which typically must be identified during site-specific investigations. Significant wildlife habitat may include features such as: seasonal concentration areas for wildlife species (e.g. snake hibernaculum), rare vegetation communities (e.g. tallgrass prairie), specialized habitats of wildlife (e.g. turtle nesting and over-wintering areas), habitats of species of conservation concern (e.g. Special Concern species as identified on the Species at Risk in Ontario list) and animal movement corridors (e.g. amphibian movement corridors). We recommend that you contact the local planning authority for potential study requirements for the identification of Significant Wildlife Habitat. In addition, when no information is available, we refer you to the Significant Wildlife Habitat Technical Guide and the recently approved Ecoregion Criterion Schedules for the identification of Significant Wildlife Habitat (January 2015). The Ecoregion Criterion Schedules and newly approved Significant Wildlife Habitat Mitigation Support Tool (MiST) can be downloaded here: <https://www.ontario.ca/search/natural-heritage-planning-resources-municipal-planning>. MNRF considers these documents to be the best available information to identify significant wildlife habitat.

### **General Information Regarding MNRF approvals:**

#### **Fish and Wildlife Conservation Act**

Please note that you may require a Scientific Collector's Permit from our office if you will be doing any fish or wildlife sampling, collection, salvage, or relocation within Peterborough District. For more information about Scientific Collector's Permits, please contact Julie Formsma, Fish and Wildlife Technical Specialist at 705-755-3296.

#### **Other Approvals**

It is the responsibility of the proponent to acquire all other information and necessary approvals from any other municipal, provincial or federal authority under other legislation. We recommend that you contact your local Conservation Authority, Department of Fisheries and Oceans, Ministry of the Environment and Climate Change, Ministry of Tourism, Culture and Sport, etc.

If you have any questions regarding the above comments, don't hesitate to contact me. Please reference the file number in the subject line for any future correspondence.

Sincerely,

Jenny

Jenny Li

Land Use Planning Assistant Summer Student  
Peterborough District  
Ontario Ministry of Natural Resources and Forestry  
300 Water Street, 1<sup>st</sup> Floor South  
Peterborough, ON K9J 8M5  
Email: [Jenny.Li2@ontario.ca](mailto:Jenny.Li2@ontario.ca)





Little Cataraqui Creek Complex  
PSW



- Legend**
- MNR Evaluated Wetland
  - Road
  - Waterbody
  - Watercourse
  - c S17** Wetland Vegetation Community

**PUBLICATION**

© Queen's Printer for Ontario  
Printed in Ontario, Canada  
April, 2012.

Cartography by Peterborough  
District GIS.

Universal Transverse Mercator  
projection, Zone 17.  
North American Datum 1983

**SOURCE OF INFORMATION**

Information provided by the Ministry of Natural Resources district office in Peterborough.  
Ministry of Natural Resources - Peterborough District 300 Water Street, 1st Floor South,  
Peterborough, ON K9J 8M5

Base information from the Natural Resources Values Information System (NRVIS).

**NOTE**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should be viewed as illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

For detailed information on natural features such as their location, size or status, the individual files held by the Peterborough district office of the Ministry of Natural Resources should be consulted.



# Peterborough District MNR

## Wetland Summary Report

Report Generated:  
May-25-17



Wetland Name: **Little Cataraqui Creek Complex**  
Wetland Code: KG-KNG-CR-018      Significance: PSW  
LIO (OGF) ID: 1251546549      ☐ Historical Record? (No longer in LIO).

OWES Edition: Third Edition      Scoring System: Southern  
Upper Tier Municipalities: City of Kingston

Last Field Evaluation 1992-Jul  
Last Desktop Update: 2005-Mar

Lower Tier Municipalities: n/a

EcoDistrict: 6e-15  
Wetland Size (ha): 320.7  
Catchment Area (ha):

Conservation Authority: Cataraqui Region CA

MNR Area Team: Kingston

### Evaluation Notes:

A Provincially significant, coastal wetland complex, made up of three individual wetlands, composed of two wetland types (28% swamp and 72% marsh) (Boxall, 1992).

|                             |            |
|-----------------------------|------------|
| Biological Component:       | 161        |
| Social Component            | 224        |
| Hydrological Component:     | 219        |
| Special Features Component: | 250        |
| <b>Total Score:</b>         | <b>854</b> |
| Significance:               | PSW        |

Evaluation Authors: J. Boxall

### Dominant Vegetation Forms (%)

|               |   |      |    |       |
|---------------|---|------|----|-------|
| h             | 5 | ts   | 23 | be    |
| c             | 1 | ls   |    | re 40 |
| dh            |   | gc   |    | ff    |
| dc            |   | m    |    | f     |
| ds            |   | ne 9 |    | su 17 |
| unvegetated 5 |   |      |    |       |

### Soils (%)

|             |    |
|-------------|----|
| clay/loam   | 20 |
| silt/marl   |    |
| limestone   |    |
| sand        |    |
| humic/mesic | 60 |
| fibric      | 20 |
| granite     |    |

### Vegetation Communities:

Boxall, 1992:

One Form

M1: re- Typha latifolia;

M6: ne- Phalaris arundinacea;

W8: su- Potamogeton spp., Myriophyllum spp., Elodea canadensis;

Two Forms

M2: ne- Leersia oryzoides, Carex spp., grasses; gc- Eupatorium maculatum, Bidens cernua, Alisma triviale;

M3: re- Typha latifolia; ne- Leersia oryzoides, Sparganium spp., Carex spp., grasses;

W4: su- Potamogeton spp., Myriophyllum spp.; ff- Lemna minor;

M9: ne- Phalaris arundinacea, Carex spp.; f- Nymphaea odorata;

M10: ne- Butomus umbellatus, Phalaris arundinacea,

Sparganium spp.; su- Elodea canadensis;

S1: ts- Salix spp.; ne- Carex spp., grasses;

S4: ts- Fraxinus nigra, Salix spp.; re- Typha latifolia;

Three Forms

M5: re- Typha latifolia; ne- Scirpus spp., Carex spp., grasses; ff- Lemna minor;

W7: su- Potamogeton spp., Myriophyllum spp.; ff- Nymphaea odorata; ff- Lemna minor;

M11: ne- Carex spp., grasses; su- Elodea canadensis,

Potamogeton spp.; re- Typha latifolia

W13: su- Potamogeton spp., Myriophyllum spp.; ff- Lemna minor; ds- Salix spp., Cornus spp.;

S2: ts- Fraxinus nigra, Cornus spp.; ls- Cornus spp., Spiraea alba; ne- Carex spp., grasses;

S3: h- Fraxinus nigra; ts- Salix spp.; ne- Carex spp., grasses;

S5: ts- Fraxinus nigra, Salix spp., Cornus spp.; re- Typha latifolia; ne- Phalaris arundinacea;

S7: ts- Fraxinus nigra, Salix spp., Cornus spp.; ls- Cornus spp., Salix spp.; gc- mixed forbes;

S8: ts- Alnus rugosa, Cornus spp.; ne- Carex spp., grasses; gc- mixed forbes;

S9: ts- Ulmus americana, Fraxinus nigra; ne- Sparganium spp.;

dc- Thuja occidentalis

S10: ts- Alnus rugosa; re- Typha latifolia; dh- Fraxinus nigra;

Four Forms

### Site Type (%)

|                              |    |
|------------------------------|----|
| Isolated                     |    |
| Palustrine                   | 29 |
| Riverine                     | 44 |
| Riverine (at rivermouth)     | 17 |
| Lacustrine (at rivermouth)   |    |
| Lacustrine (enclosed bay)    |    |
| Lacustrine (exposed to lake) |    |

Wetland Name: Little Cataraqui Creek Complex

Significance: PSW

Wetland ID: KG-KNG-CR-018

LIO ID 1251546549



---

M12: re- Typha latifolia; ne- Scirpus spp., Carex spp.,  
Sparganium spp.; su- Potamogeton spp., Myriophyllum spp.; ff-  
Lemna minor;  
S6: ts- Salix spp., Fraxinus nigra; ls- Salix spp., Cornus spp.,  
Spiraea alba; gc- mixed forbes; ne- Carex spp., grasses;  
S11: c- Thuja occidentalis; h- Fraxinus nigra; ts- Fraxinus nigra,  
Thuja occidentalis; gc- Impatiens capensis, mixed ferns;  
S12: ts- Salix spp., Cornus spp.; ls- Salix spp., Cornus spp.; ne-  
Carex spp., grasses; re- Typha latifolia;  
S14: h- Acer rubrum; ts- Acer rubrum, Alnus rugosa; gc- mixed  
ferns; ne- Carex spp., grasses;

Five Forms

S13: ts- Alnus rugosa, Salix spp.; ls- Alnus rugosa, Salix spp.; ne-  
Carex spp., grasses; re- Typha latifolia; gc- mixed forbes;

Social Component Summary

Wild Rice Present? ☐ Source:

Comm. Fish Present? ☐ Source:

Furbearers

Beaver, Muskrat, Raccoon, Red Fox (all- field obsv.);

Recreational Activity Intensity

Hunting

Nature Enjoyment  
/ Ecosystem Study

Fishing

Proximity to Settlement  
to

Threats to Communities:

Wetland intact but impairment of ecosystem quality intense in some areas (Boxall, 1992).

Biodiversity Summary:

Breeding Habitat for Endangered  
or Threatened Species:

Prov. Sig. Animals:

Boxall, 1992:  
Black-crowned Night Heron, Caspian Tern and Black  
Tern (all- field obsv.);

Prov. Sig. Plants:

Regionally Sig. Species:

Locally Significant Species:

Special Features

Colonial Waterbird Notes:

Winter Cover for Wildlife

Details:

Waterfowl Staging

Waterfowl Moulting

Waterfowl Breeding

Migratory Stopover

Fish Habitat

Details:

Land Uses: Recreational Activity (Boxall, 1992):  
Hunting- low, Nature Enjoyment/ Ecosystem Study- high, Fishing- high;

Landuse in Catchment Basin (Boxall, 1992):  
over 50%agriculture and/or urban;

Ecological Values:

Nesting of colonial waterbirds- currently nesting- Black-crowned  
Night Heron (Boxall, 1992).  
Winter cover for wildlife- locally significant (Boxall, 1992).  
Waterfowl staging and moulting- habitat suitable (Boxall, 1992).  
Waterfowl breeding- habitat suitable (Boxall, 1992).  
Migratory passerine, shorebird or raptor stopover area- generalized  
significance (Boxall, 1992).  
Presence of fish- Northern Pike, Largemouth Bass, Yellow Perch,  
Rockbass/ Black Crappie, forage fish, Common Carp, Brown  
Bullhead (Boxall, 1992).

Other Values:

Ownership Information:

15% of wetland in public or private ownership, held under contract or in trust for wetland protection, 71% Public and 14% Private ownership (Boxall, 1992).

Wetland Name: Little Cataraqui Creek Complex

Significance: PSW

Wetland ID: KG-KNG-CR-018

LIO ID 1251546549

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*Offsite Information:*

Diversity of Surrounding Habitat (Boxall, 1992):

row crop, pasture, abandoned agricultural land, deciduous forest, coniferous forest, abandoned pits and quarries, open lake or deep river, fence rows with cover or shelterbelts, terrain undulating or hilly with ravines, creek flood plain;

Hydrologically connected by surface water to other wetlands, or open water within 1.5 km (Boxall, 1992).

**APPENDIX C**  
**SITE PHOTOGRAPHS**

**Environmental Effects Evaluation (EEE) Report**



Photograph 1: January 24, 2017. Looking east at P1 proposed parking lot.



Photograph 2: January 24, 2017. Looking west and P2 and P3 proposed parking areas.



Photograph 3: January 24, 2017. Looking northwest at existing P5 parking lot



Photograph 4: January 24, 2017. Looking west at P6 parking lot. Manicured lawn is present west of P6.



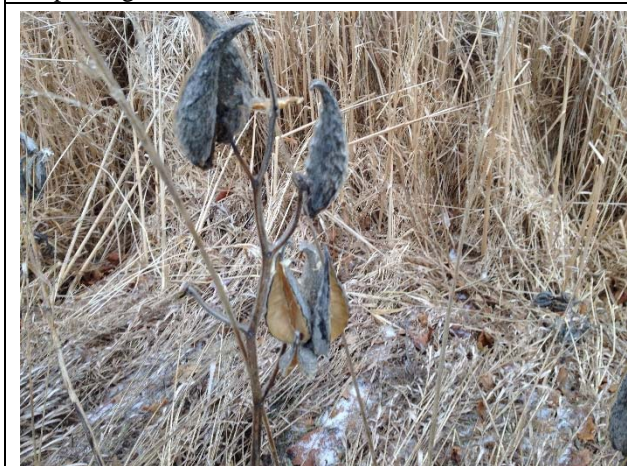
## *Environmental Effects Evaluation (EEE) Report*



Photograph 5: January 24, 2017. Looking west at P7 and P8 parking lots.



Photograph 6: January 24, 2017. Looking southeast at drainage feature (north drainage feature) southeast of P5.



Photograph 7: January 24, 2017. Common Milkweed (*Asclepias syriaca*) on bank of north drainage feature.



Photograph 8: January 24, 2017. Dense cattail where north drainage feature enters wetland complex.



**Environmental Effects Evaluation (EEE) Report**



Photograph 9: January 24, 2017. Dense shrubs and trees on western edge of wetland complex.



Photograph 10: January 24, 2017. Looking east at south drainage feature



Photograph 11: January 24, 2017. Looking west at south drainage feature as it comes out of underground culvert.



Photograph 12: January 24, 2017. Looking south from southeast corner of perimeter road.

**Environmental Effects Evaluation (EEE) Report**



Photograph 13: January 24, 2017. Looking northeast at low area east of P1 and northeast of P2 and P3.



Photograph 14: January 24, 2017. Looking southeast at wetland complex from east of P3 proposed parking lot.



**APPENDIX D**  
**RECORD OF PUBLIC PARTICIPATION DETERMINATION**

## **Environmental Effects Evaluation (EEE) Report**

### Record of Public Participation Determination

**Stage of work plan:** Early planning phase of screening (pre-scoping)

| Is there an indication that...   | Describe potential indication and issues  | Consider public participation?          |  |
|--|---|---|--|
| <i>there is an existing or likely public interest in the type, location or potential effects of the project?</i>   |   | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| <i>There are members of the public with a history of being involved in past proposed projects in the area?</i>   |   | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| <i>the project has the potential to generate conflict between environmental and social or economic values of concern to the public?</i>  |   | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| <i>the project may be <u>perceived</u> as having the potential for significant adverse environmental effects? <sup>1</sup></i>   |   | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| <i>there is potential to learn from community ecological? knowledge or Aboriginal traditional knowledge?</i>   |   | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| <i>there is uncertainty about potential direct and indirect environmental effects or the significance of identified effects?</i>   |   | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| <i>the project has been or will be subject to other public participation processes that would meet the objectives of the Ministerial Guideline <a href="http://www.ceaa.gc.ca/013/006/ministerial_guideline_e.htm">http://www.ceaa.gc.ca/013/006/ministerial_guideline_e.htm</a></i> |   | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| <i>there is any other reason why public participation is or is not appropriate?</i>  | The Project is located at medium- and minimum-security institutions and is run by Correctional Services Canada. The project is small scale and will be conducted on federal land in accordance with provincial and federal environmental regulatory requirements. As such, public consultation was not deemed to be required. | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |

<sup>1</sup> Environmental Effect as per the definition in CEAA (2012) is

- Changes to the environment to components of the environment that are within the legislative authority of Parliament (fish as defined by the Fisheries Act, aquatic species under the Species at Risk Act, and migratory birds as defined in the Migratory Birds Convention Act (1994))
- Changes to the environment that occur on federal lands, or inter-provincially or outside of Canada.
- The effect of any change on health and socio-economic condition, physical and cultural heritage, use of resources for traditional purposes and structures of historical significance are limited with respect to Aboriginal peoples.

**Environmental Effects Evaluation (EEE) Report**

**As a result of the scan above, is public participation under CEAA appropriate in the circumstances?**

☐ Yes      ☒ No

**Additional comments to support determination:**

In the Preliminary Investigation of Environmental Services Required form completed by Public Works and Government Services Canada (PWGSC 2015b), it is stated that public and aboriginal consultation is not required.

**APPENDIX E**  
DEFINITIONS AND METHODOLOGIES

## **Environmental Effects Evaluation (EEE) Report**

**Environment (defined in S.2(1))** – the components of the Earth, and includes land, water and air, including all layers of the atmosphere; and all organic and inorganic matter and living organisms (and the interacting natural systems of those).

**Environmental Effects (defined in S.5(1))** – 5.(1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project area

(a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

- (i) fish as defined in section 2 of the Fisheries Act and fish habitat as defined in subsection 34(1) of that Act,
- (ii) aquatic species as defined in subsection 2(1) of the Species at Risk Act,
- (iii) migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and
- (iv) any other component of the environment that is set out in Schedule 2;

(b) a change that may be caused to the environment that would occur:

- (i) on federal lands,
  - (ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or
  - (iii) outside Canada; and
- (c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on
- (i) health and socio-economic conditions,
  - (ii) physical and cultural heritage,
  - (iii) the current use of lands and resources for traditional purposes, or
  - (iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

(2) However, if the carrying out of the physical activity, the designated project or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also to be taken into account:

- (a) a change, other than those referred to in paragraphs (1)(a) and (b), that may be caused to the environment and that is directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of the physical activity, the designated project or the project; and
- (b) an effect, other than those referred to in paragraph (1)(c), of any change referred to in paragraph (a) on
  - (i) health and socio-economic conditions,
  - (ii) physical and cultural heritage, or
  - (iii) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Schedule 2 (3) The Governor in Council may, by order, amend Schedule 2 to add or remove a component of the environment.

**Federal Authority (defined in S.2(1))** – a Minister of the Crown in right of Canada; an agency of the Government of Canada or a parent Crown corporation, as defined in subsection 83(1) of the *Financial Administration Act (FAA)*; or any department or departmental corporation that is set out in Schedule I or II to the FAA.

## **Environmental Effects Evaluation (EEE) Report**

Federal lands (defined in S.2(1)) – defined as follows:

- lands that belong to Her Majesty in right of Canada, or that Canada has power to dispose of, and all waters on and airspace above those lands, other than lands under the administration and control of the Commissioner of Yukon, the Northwest Territories or Nunavut;
- the internal waters of Canada, in any area of the sea not within a province;
- the territorial sea of Canada in any area of the sea not within a province;
- the exclusive economic zone of Canada, and the continental shelf of Canada; and
- reserves, surrendered lands and any other lands that are set apart for the use and benefit of a band and that are subject to the *Indian Act*, and all waters on and airspace above those reserves or lands.

Mitigation measures (defined in S. 2(1)) – measures for the elimination, reduction or control of the adverse environmental effects of a designated project, and includes restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means.

Project (defined in S. 66) – a physical activity that is carried out in relation to a physical work and is not a designated project.

Valued Ecosystem Component (defined on Agency - [www.ceaa.gc.ca/default.asp?lang=En&n=B7CA71391&offset=3#v](http://www.ceaa.gc.ca/default.asp?lang=En&n=B7CA71391&offset=3#v)) - The environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance.

The value of an ecosystem component may be determined on the basis of cultural ideals or scientific concern. Valued ecosystem components that have the potential to interact with project components should be included in the assessment of environmental effects.

### **Methodology**

The environmental effects evaluation methodology used in this report focuses the evaluation on those environmental components of greatest concern. The Valued Ecological Components (VECs) most likely to be affected by the project as described are indicated in Table 1. VECs were selected based on ecological importance to the existing environment (above), the relative sensitivity of environmental components to project influences and their relative social, cultural or economic importance. The potential impacts resulting from these interactions are described below.

### **Evaluation of Environmental Effects**

The VECs selected in Table 3 are addressed in Table 4 in the EEE. The residual effects of the project on the environment are defined. Similarly, the physical works/activities and required mitigation measures are detailed and the significance of residual (post-mitigation) effects is estimated.

The following ratings are based on:

- **information provided by the proponent;**
- **a review of project related activities;**
- **an appraisal of the environmental setting, and identification of resources at risk;**
- **the identification of potential impacts within the temporal and spatial bounds; and**
- **personal knowledge and professional judgment of the assessor.**

The significance of project related impacts was determined in consideration of their frequency, the duration and geographical extent of the effects, magnitude relative to natural or background levels, and whether the effects are reversible or are positive or negative in nature. These criteria are indicated in the following table.

## **Environmental Effects Evaluation (EEE) Report**

### **Assessment Criteria for Determination of Significance.**

|                          |  |   |
|--------------------------|--|---|
| <b>Magnitude</b>         | Magnitude, in general terms, may vary among Issues, but is a factor that accounts for size, intensity, concentration, importance, volume and social or monetary value. It is rated as compared with background conditions, protective standards or normal variability. |   |
|                          | Small  | Relative to natural or background levels                        |
|                          | Moderate   | Relative to natural or background levels                        |
|                          | Large  | Relative to natural or background levels                        |
| <b>Reversibility</b>     | Reversible   | Effect can be reversed  |
|                          | Irreversible   | Effects are permanent   |
| <b>Geographic Extent</b> | Immediate  | Confined to project site  |
|                          | Local  | Effects beyond immediate project site but not regional in scale |
|                          | Regional   | Effects on a wide scale   |
| <b>Duration</b>          | Short Term   | Between 0 and 6 months in duration                              |
|                          | Medium Term  | Between 6 months and 2 years                                    |
|                          | Long Term  | Beyond 2 years  |
| <b>Frequency</b>         | Once   | Occurs only once  |
|                          | Intermittent   | Occurs occasionally at irregular intervals                      |
|                          | Continuous   | Occurs on a regular basis and regular intervals                 |

**APPENDIX F**  
**MITIGATION TABLE**



### **Environmental Effects Evaluation (EEE) Report**

| <b>Environmental Component</b> | <b>Reference</b> | <b>Mitigation Measures</b>  | <b>Phase</b>                      | <b>Responsibility</b> |
|--------------------------------|------------------|---|-----------------------------------|-----------------------|
| Fish ( <i>Fisheries Act</i> )  | Part C, Table 4  | <ul style="list-style-type: none"> <li>• All waste materials must be disposed of in accordance with the applicable regulatory agency guidelines so as to mitigate potential effects generated by leachate entering the adjacent waters.</li> <li>• In the case that contaminated soils (identified by CIMA 2015) are to be excavated and disposed of, special management of these soils will not be required as laboratory reports have deemed the soils non-hazardous if disposed off-site (Dillon Consulting 2012).</li> <li>• If any construction debris/material, (e.g., plastic, food scraps, etc.) enter the aquatic environments they must be removed immediately and disposed of in accordance with the applicable regulatory agency guidelines.</li> <li>• Drainage from Lot P5 (Appendix A – Figure 3) construction should be effectively controlled through erosion and sediment control measures as specified below.</li> <li>• In the event dewatering is required within excavated watermain area, do not pump water containing suspended materials into waterways, sewers, drainage systems or any other areas of construction. The water should be pumped through a sediment removal system prior to discharge away from the project area. All chlorinated water discharged to the natural environment shall also be dechlorinated prior to release.</li> <li>• In order to control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements, an erosion and sediment control (ESC) plan should be developed by the Contractor to mitigate potential effects on water quality, and appropriate measures should be adopted to minimize any impacts of accidental spills during construction. The ESC Plan shall be in place prior to conducting work and should consider the following: <ul style="list-style-type: none"> <li>• ESC measures (e.g., temporary matting, geotextile filter fabric, etc.) are to be installed prior to construction to prevent erosion/runoff from impacting tributaries and wetland areas.</li> <li>• ESC measures are to be left in place until vegetation is re-established and/or all exposed soils are stabilized.</li> <li>• Inlet protection at all existing catch basins/storm drains/outfalls (not being immediately replaced) should be installed prior to the commencement of construction and will remain functional until construction completion.</li> <li>• Control measures should be inspected daily to ensure they are functioning and are maintained as required. If the control measures are not functioning properly, no further work will occur until the problem is fixed.</li> </ul> </li> <li>• Restore disturbed areas as soon as possible to minimize the duration of soil</li> </ul> | Site Preparation and Construction | Contractor(s)         |

### **Environmental Effects Evaluation (EEE) Report**

| Environmental Component | Reference       | Mitigation Measures  | Phase | Responsibility |
|-------------------------|-----------------|--|-------|----------------|
|                         |                 | <p>exposure. Restoration should be to a pre-disturbed state or better.</p> <ul style="list-style-type: none"> <li>The exposed soil area must be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. All stockpiled soil must be covered and/or diked to prevent erosion and release of sediment laden water. Wherever possible, exposed soil is to be replanted or sodded to ensure soil stabilization.</li> <li>All activities including maintenance procedures should be controlled to prevent the entry of concrete, petroleum products, or other deleterious substances into the water.</li> <li>Machinery must undergo daily inspections, be checked for leakage and must be in good working order. Refuel, service and wash vehicles at a pre-designated location at least 30 m away from any water body and on an impermeable surface with a collection system.</li> <li>Basic spill control equipment must be on site at all times. All spills or leaks must be promptly contained, cleaned up and reported to the Ontario Spills Action Centre (1-800-260-6060). CSC's Environmental reporting system, as outlined in the Internal Services Directive 318 (i.e. via form 1265-03 "Environmental Incident Report") should also be followed as appropriate. Disposal of waste generated by a spill will be done in compliance with Ontario Waste Regulations at a Ministry of the Environment and Climate Change approved waste facility.</li> </ul> <p>A Spills Management and Emergency Response Plan will be developed by the Contractor and implemented as needed. All workers should be fully aware of the spill prevention and response procedures.</p> |       |                |
| Birds (MBCA and FWCA)   | Part C, Table 4 | <ul style="list-style-type: none"> <li>All work is to be undertaken in compliance with the <i>Migratory Birds Convention Act, 1994</i> and the <i>Fish and Wildlife Conservation Act, 1997</i>.</li> <li>Tree/shrub removal must not take place during the bird breeding season until fledglings have left parental territories, i.e., vegetation clearing is to be avoided from April 1 to August 28 (ECCC 2016).</li> <li>If vegetation removal is to be conducted between April 1 and August 28, a bird nest survey shall be conducted by a qualified avian biologist in the areas flagged for vegetation removal immediately (i.e., within 2 days) prior to commencement of the work to identify and locate active nests of species covered by the MBCA. If nests are observed, an adaptive mitigation plan (which may include establishing appropriate buffers around active nests) should then be developed to address any potential impacts on migratory birds or their active nests, and should be reviewed</li> </ul>   | All   | Contractor(s)  |

### **Environmental Effects Evaluation (EEE) Report**

| <b>Environmental Component</b> | <b>Reference</b> | <b>Mitigation Measures</b>   | <b>Phase</b> | <b>Responsibility</b> |
|--------------------------------|------------------|--|--------------|-----------------------|
|                                |                  | <p>by ECCC prior to implementation.</p> <ul style="list-style-type: none"> <li>• To minimize the potential for birds to nest within the project footprint during construction, the exposed wall of the excavated watermain trench should not be allowed to remain idle or exposed without activity for more than 48 hours during the bird nesting period (between April 1 and August 28). If areas of the trench are to be exposed without activity for more than 48 hours, the exposed excavation wall should be covered with tarping until work resumes in the area. Stockpiles soils should also be kept at a maximum height of 3 m, with the edges sloped at least 45 degrees to prevent nesting.</li> <li>• Disturbances to all birds in and near the project area must be avoided as much as possible. If a bird protected under the MBCA is found to be using the construction area for breeding or nesting, the Contractor will halt work and contact ECCC for guidance prior to work commencing.</li> <li>• Maintain machinery on regular basis to minimize construction noise and equipment emissions.</li> <li>• Cover or wet down dry materials and rubbish to prevent blowing dust and debris.</li> <li>• Proponents and Contractors must ensure that food scraps and garbage are not left at or near the project site.</li> <li>• Ensure qualified workers operate machinery/equipment to reduce the chance of unintentional damage.</li> <li>• Minimize sources of unnecessary noise or encroachment of worker activities in order to limit the extent of the project influence when possible.</li> </ul> |              |                       |
| Health and Socio Economic      | Part C, Table 4  | <ul style="list-style-type: none"> <li>• The Contractor shall prepare a waste management plan to deal with non-hazardous waste.</li> <li>• Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labeling and provision of MSDS acceptable to Labour Canada.</li> <li>• Activities must be conducted by qualified contractor to meet Health Canada regulations.</li> <li>• Post signage in appropriate areas to identify risks/hazards and required personal protective equipment.</li> <li>• Workers who may come in contact with hazards must be provided with and use appropriate personal protective equipment.</li> </ul>  | Construction | Contractor(s)         |

**Environmental Effects Evaluation (EEE) Report**

| Environmental Component  | Reference       | Mitigation Measures  | Phase        | Responsibility |
|--|-----------------|--|--------------|----------------|
|  |                 | <ul style="list-style-type: none"> <li>• Site access must be restricted to authorized workers only. Signs should be posted where applicable.</li> <li>• Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Dust suppression measures must be applied to prevent fugitive dust.</li> <li>• Workers should be notified that construction activities in the area may encounter impacted soils and exposure is only expected to occur for the construction worker via incidental ingestions.</li> </ul>   |              |                |
| HAPA Significance  | Part C, Table 4 | <ul style="list-style-type: none"> <li>• Work and travel in designated areas.</li> <li>• Provide avoidance signage on significant heritage structures during construction.</li> <li>• Ensure all workers are aware that significant features are not to be disturbed.</li> <li>• Ensure qualified workers operate machinery/equipment to reduce the chance of unintentional damage.</li> </ul>   | Construction | Contractor(s)  |
| Water  | Part C, Table 4 | <ul style="list-style-type: none"> <li>• Apply mitigation measures as per the “Fish (Fisheries Act)” valued ecosystem component.</li> <li>• Ensure site drainage conditions are accounted for in site development plans.</li> <li>• Provide and maintain temporary drainage ditches and other diversions outside of excavation limits, as required, to keep excavations free of water while work is in progress and to protect open excavations against flooding and damage due to surface run-off.</li> <li>• Be aware of the recently decommissioned and active monitoring wells located throughout the project area. It is recommended that all groundwater monitoring wells throughout the project site be decommissioned at the onset of this project.</li> </ul>   | All          | Contractor(s)  |
| Birds (not protected under the MBCA), Wildlife, and their Habitat (FWCA) | Part C, Table 4 | <ul style="list-style-type: none"> <li>• Ensure all workers are aware of which vegetation remains and protect trees/shrubs adjacent to work areas from damage by wrapping them in burlap and/or encasing them with protective wood framework or tree hoarding (snow fence).</li> <li>• Protect roots of designated trees during construction to prevent disturbance or damage. Avoid unnecessary traffic, dumping, and storage of materials over root zones (e.g., under tree driplines). Minimize stripping of topsoil and vegetation. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.</li> <li>• Should wildlife (mammals, reptiles, amphibians, birds, etc.) be encountered at any time during the project, measures are to be implemented to avoid destruction, injury, or interference with the species (such as temporary ceasing work which</li> </ul> | All          | Contractor(s)  |

**Environmental Effects Evaluation (EEE) Report**

| Environmental Component | Reference       | Mitigation Measures  | Phase                             | Responsibility |
|-------------------------|-----------------|--|-----------------------------------|----------------|
|                         |                 | <p>would pose immediate threat and then waiting for the individual to flee the site for alternative cover).</p> <ul style="list-style-type: none"> <li>• Maintain machinery on regular basis to minimize construction noise and equipment emissions.</li> <li>• Minimize the frequency of dust-generating construction activities during prolonged periods of dry weather.</li> <li>• Employ measures to minimize dust generation during work activities.</li> <li>• Proponents and Contractors must ensure that food scraps and garbage are not left at or near the Project site.</li> <li>• Disturbances to all wildlife in and near the project area must be avoided as much as possible.</li> <li>• Minimize duration and extent of disturbance to existing vegetation and natural areas serving as habitat.</li> <li>• Minimize sources of unnecessary noise or encroachment of worker activities in order to limit the extent of the project influence when possible.</li> </ul>   |                                   |                |
| Soil                    | Part C, Table 4 | <ul style="list-style-type: none"> <li>• Prevent contamination of access roads. Immediately scrape up debris or material on access roads which is suspected to be contaminated; transport and place into designated area.</li> <li>• Excess or stockpiled soil must be stored on site for the shortest time possible, remain covered, and be disposed of at an approved facility in accordance with the applicable regulatory agency guidelines.</li> <li>• Debris and waste materials should likewise be stored on site for the shortest time possible, remain covered, and be disposed of at an approved facility in accordance with the applicable regulatory agency guidelines.</li> <li>• Work should be scheduled to avoid periods of heavy precipitation. ESC measures (e.g., temporary matting, geotextile filter fabric, etc.) are to be used, as appropriate, to prevent erosion and release of sediments and/or sediment laden water during the construction phase. These structures are to be left in place until vegetation is re-established and/or all exposed soils are stabilized.</li> <li>• Cut-and-cover construction should be supported by sheeting and shoring or use of a trench box, as appropriate, to prevent soils from eroding and slumping into the trench and to maintain a narrow construction corridor.</li> <li>• Keep excavations clean, free of standing water, and loose soil. Where soil is subject</li> </ul> | Site Preparation and Construction | Contractor(s)  |

### **Environmental Effects Evaluation (EEE) Report**

| <b>Environmental Component</b>                   | <b>Reference</b> | <b>Mitigation Measures</b>  | <b>Phase</b> | <b>Responsibility</b> |
|--|------------------|---|--------------|-----------------------|
|  |                  | <p>to significant volume change due to change in moisture content, cover and protect to Department Representative's approval.</p> <ul style="list-style-type: none"> <li>• To protect trench excavation from soil erosion, do not excavate more than 30 m of trench in advance of watermain installation operations and do not leave open more than 15 m at end of day's operation, unless otherwise authorized by Department Representative in writing. Trench segments should be excavated and closed promptly, minimizing the time that trenches are open. The trench should be backfilled with clean fill or re-filled with excavated soils, if deemed suitable (uncontaminated). Do not mix topsoil with subsoil for excavated soils to be reused on site.</li> <li>• Exposed soil areas must be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. All stockpiled soil should be covered and/or diked as feasible to prevent erosion and release of sediment laden water.</li> <li>• Basic petroleum spill clean-up equipment must be on site at all times. All spills or leaks must be promptly contained, cleaned up, and reported to Ontario Spills Action Centre at 1-800-268-6060.</li> </ul>   |              |                       |
| Terrestrial SAR and their Habitat (SARA and ESA) | Part C, Table 4  | <ul style="list-style-type: none"> <li>• Develop a protocol for Species at Risk encounters.</li> <li>• Employ measures to minimize dust generation during work activities.</li> <li>• Proponents and Contractors must ensure that food scraps and garbage are not left at or near the project site.</li> <li>• Should any SARA- or ESA-protected species, or its habitat (e.g., snake hibernacula) be encountered at any time during the Project, measures are to be implemented to avoid destruction, injury, or interference with the species, its residence and/or its habitat (e.g., through siting, timing, or design changes). Work shall cease and the Project Manager should contact the Departmental Representative and ECCC (see Part A for contact information) for advice on how to proceed and MNRF for notification of the sighting.</li> <li>• If an injured/deceased SAR is found, the specimen should be placed in a non-airtight, fully labelled container and kept at a temperature so as to not worsen its condition. For additional guidance, MNRF and ECCC staff must be contacted immediately (see Part A for contact information).</li> <li>• All work is to be undertaken in compliance with the Species at Risk Act, 2002 and the Endangered Species Act, 2007.</li> <li>• In order to minimize the potential for incidental disturbance to protected birds,</li> </ul> | All          | Contractor(s)         |

**Environmental Effects Evaluation (EEE) Report**

| Environmental Component | Reference       | Mitigation Measures  | Phase        | Responsibility |
|-------------------------|-----------------|--|--------------|----------------|
|                         |                 | <p>vegetation clearing and any proposed work activities should be undertaken outside of the regional nesting period (April 1 through August 28).</p> <ul style="list-style-type: none"> <li>• If works are to be conducted during the regional nesting period, a bird nest survey shall be conducted by a qualified avian biologist in the areas flagged for vegetation removal immediately (i.e., within 2 days) prior to commencement of the work to identify and locate active nests of species covered by SARA and/or the ESA. If nests are observed, an adaptive mitigation plan (which may include establishing appropriate buffers around active nests) should then be developed to address any potential impacts on protected birds or their active nests, and should be reviewed by the appropriate agency (ECCC or MNRF) prior to implementation.</li> <li>• Confine construction equipment/vehicles to the access roads and project area to minimize impacts to vegetation.</li> </ul>  |              |                |
| Air Quality             | Part C, Table 4 | <ul style="list-style-type: none"> <li>• Vehicles/machinery to be in good repair, equipped with emission controls as applicable and operated within regulatory requirements.</li> <li>• Comply with operating specifications for heavy equipment and machinery.</li> <li>• Vehicles and machinery should not be left idling while not in use.</li> <li>• Minimize vehicle traffic on exposed soils.</li> <li>• Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.</li> <li>• Soils will only be transported in secure holdings to limit loss of soils as dust.</li> <li>• Stabilize areas of stockpiled or exposed soils using tarps or other similar covers.</li> <li>• Avoid activities with the potential to release airborne particles during windy and prolonged dry periods.</li> <li>• Keep the main entrance road clear of any mud or earth tracked from vehicles.</li> <li>• Keep asphalt surfaces clean of debris resulting from removal operations.</li> <li>• Workers to wear protective gear (e.g., safety work boots, respirators, hard hats, etc.) in accordance with the <i>Occupational Health and Safety Act, 1990</i> (OHSA) and regulations.</li> <li>• Work shall be carried out in compliance with the <i>Canadian Environmental Protection Act, 1999</i> (CEPA), and applicable air emission regulations and by-laws.</li> </ul> | Construction | Contractor(s)  |

**Environmental Effects Evaluation (EEE) Report**

| <b>Mitigation Table – to be forwarded to proponent</b>   |
|--|
| <p>It is reasonable to conclude that with appropriate mitigation in place and good work practices, significant adverse environmental effects will be of short duration and the potential zone of influence will be confined to the immediate vicinity if the work.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"><li>• Please refer to mitigation measures above (EEE Appendix F).</li><li>• Any and all stipulations of federal, provincial, or municipal authorities and/or their officers must be strictly followed. As a best practice the most stringent standards must be used where applicable. Any discrepancies must be successfully resolved before the pertinent work may begin.</li></ul> |
| <p><b>Site monitoring (accuracy and compliance monitoring) may be conducted to verify whether required mitigation measures were implemented. The proponent must provide site access to Responsible Authority officials and/or its agents upon request</b></p>  |



# DRAFT GEOTECHNICAL INVESTIGATION REPORT

COLLINS BAY INSTITUTION  
PROPOSED NEW PARKING LOTS

KINGSTON, ONTARIO

Prepared for:

**Public Works and Government Services Canada (PWGSC)**

Date: February 2016

Project No. 141-14303-10

**WSP Canada Inc.**

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# 1 INTRODUCTION

## 1.1 CONTEXT

WSP Canada Inc. (WSP) was retained by Public Works and Government Services Canada (PWGSC) to conduct a geotechnical investigation as part the design and construction of the proposed new parking areas at Collins Bay Institution in Kingston, Ontario.

The Terms of Reference (TOR) for this investigation are outlined in WSP's Proposal dated January 18, 2016 and subsequent project correspondence.

The purpose of the geotechnical investigation was to obtain subsurface information at the site by means of exploratory boreholes. This report presents the findings of the investigation and provides comments and recommendations related to the geotechnical aspects of the project.

## 1.2 PROJECT DESCRIPTION

The project site is located on the grounds of the Collins Bay Institution (CBI), located at 1455 Bath Rd. in Kingston, ON as shown in Drawing No. 1. It is understood that that the number of parking spaces on site is to be increased from 268 to 359. This expansion will be accomplished by the realignment of the local access road so that it runs through existing parking areas, the expansion of parking lot P6 to the west and the construction of a new parking lot P1 to the north of the existing parking lot P1. It is understood that the parking lot expansion will also involve the installation of new site services.

## 1.3 OBJECTIVES AND LIMITATIONS

The current report was prepared at the request and for the sole use of the Public Works and Government Services Canada according to the specific terms of the mandate given to WSP. The use of this report by a third party, as well as any decision based upon this report, is under this party's sole responsibility. WSP may not be held accountable for any possible damages resulting from third party decisions based on this report.

Furthermore, any opinions regarding conformity with laws and regulations expressed in this report are technical in nature; the report is not and shall not, in any case, be considered as a legal opinion.

Information in this report is only valid for the borehole locations as described.

# 2

## SITE INVESTIGATION

### 2.1 SCOPE OF WORK

The scope of work for this assignment included:

- A desk study and review of existing geotechnical information in the general area;
- Laying out the boreholes and obtaining utility locates at the project site;
- Drilling six exploratory boreholes at the existing and proposed parking lot locations;
- In-situ soil sampling and testing, including Standard Penetration Testing (SPT);
- Obtaining soil and rock samples for additional review and laboratory testing;
- Laboratory testing;
- Geotechnical analysis; and
- Preparation of this report which presents the results of the investigation and provides geotechnical recommendations related to the design and construction of the proposed parking lots.

### 2.2 INVESTIGATION PROCEDURES

The geotechnical investigation was carried out in January 2016.

#### 2.2.1 DESK STUDY

Surficial geology maps indicate that the area is underlain by fine-textured glaciolacustrine deposits consisting of silt and clay with minor deposits of sand and gravel. Bedrock geology maps indicate the rock in the general area includes limestone and dolostone of the Gull River Formation.

#### 2.2.2 FIELD INVESTIGATION

The field investigation was carried out on January 25 and 26, 2016 and included the drilling of six boreholes (BH16-1 through BH16-6) within the boundaries of the proposed parking lots, as shown on Drawing No. 2.

The boreholes were advanced using a truck-mounted drill rig supplied and operated by Canadian Environmental Drilling of Kingston Ontario. The boreholes were advanced using hollow-stem augers to a maximum depth of 4.4 m below the existing surface elevation. In boreholes BH16-3 and BH16-4, auger refusal was encountered at depths of 4.1 m and 3.5 m below the existing surface elevation, respectively. Both boreholes were extended past the depth of refusal to a maximum depth of 5.6 m below the existing ground surface using “N” sized diamond coring equipment. Soil and rock samples retrieved during drilling were logged and visually classified in the field by a member of WSP’s geotechnical staff. In-situ tests including Standard Penetration Testing (SPT) were carried out at regular intervals.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations. Monitoring wells were installed in all the boreholes, save borehole BH16-3, to allow for long-term groundwater level monitoring.

The borehole locations are shown in Appendix A. Borehole logs are included in Appendix B of this report.

### 2.2.3      LABORATORY TESTING

Upon completion of drilling and in-situ testing, soil and rock samples were returned to WSP's laboratory for further examination, classification and testing. A laboratory testing program, carried out on selected representative soil samples, included the determination of natural water content, grain size distribution and Uniaxial Compressive Strength (UCS).

The results of natural water content tests are included on the relevant borehole logs in Appendix B. The results grain size distributions and UCS testing are summarized on the individual borehole logs and presented in Appendix C.

# 3

## SUBSURFACE GEOTECHNICAL CONDITIONS

The subsurface soil profile at the site generally consists an asphaltic pavement structure or topsoil overlying a layer of clayey silt which extends to the depth of drilling. In boreholes BH15-3 and BH15-4, underlying the clayey silt, limestone bedrock was encountered.

Specific descriptions of individual geological units are presented below.

### 3.1 SOIL CONDITIONS

#### 3.1.1 PAVEMENT STRUCTURE

The existing pavement structure in boreholes BH16-1, BH16-5 and BH16-6 consists of an asphaltic concrete overlying a granular road base consisting of crushed sand and gravel. The asphaltic concrete in borehole BH16-1, drilled in parking lot P6 was 50 mm in thickness and the crushed sand and gravel layer was 240 mm in thickness. In boreholes BH16-5 and BH16-6, drilled in parking lot P2 the asphaltic concrete thickness ranged from 65 mm to 80 mm and the crushed sand and gravel layer ranged in thickness from 365 mm to 480 mm.

Grain size curves for three selected samples of the granular road base are presented in Appendix C. A summary of these grain size distributions are also presented in the table below.

**Table 1 – Results of Grain Size Analyses for Granular Road Base**

| Borehole No. | Sample No. | Grain Size Distribution |        |         |
|--------------|------------|-------------------------|--------|---------|
|              |            | % Gravel                | % Sand | % Fines |
| BH16-1       | GS1        | 42                      | 50     | 8       |
| BH16-5       | GS1        | 45                      | 41     | 14      |
| BH16-6       | GS1        | 34                      | 47     | 19      |

The natural water content of samples within the granular road base ranged from 1 percent to 5 percent.

#### 3.1.2 TOPSOIL

In boreholes BH16-2, BH16-3 and BH16-4 a layer of topsoil was encountered which ranged in thickness from 150 mm to 180 mm.

#### 3.1.3 CLAYEY SILT

A deposit of native silt which ranged from clayey silt to silt with some clay (referred to in this report as clayey silt as this is the predominant soil type) was encountered underlying the pavement structure or topsoil in all the boreholes drilled at the site. This deposit extended to the depth of drilling, 4.4 m below the existing surface elevation, or the depth of refusal, 4.1 m and 3.5 m below the existing surface elevation in boreholes BH16-3 and BH16-4, respectively. Standard penetration tests carried out within the clayey silt gave 'N' values ranging from 6 blows to 30 blows per 305 mm of penetration indicating a loose to compact state of packing.



Grain size curves for three selected samples of the clayey silt are presented in Appendix C. A summary of these grain size distributions are also presented in the table below.

**Table 2 – Results of Grain Size Analyses for Clayey Silt**

| Borehole No. | Sample No. | Grain Size Distribution |        |        |        |
|--------------|------------|-------------------------|--------|--------|--------|
|              |            | % Gravel                | % Sand | % Silt | % Clay |
| BH16-2       | SS3        | 0                       | 2      | 74     | 24     |
| BH16-4       | SS4        | 0                       | 1      | 82     | 17     |
| BH16-6       | SS5        | 0                       | 0      | 70     | 30     |

### 3.1.4 AUGER REFUSAL/BEDROCK

Auger refusal was encountered in boreholes BH16-3 and BH16-4 at depths of 4.1 m and 3.5 m below the existing ground surface, respectively and each borehole was extended beyond the refusal depth using “N” sized diamond coring equipment.

The rock encountered in the cored holes includes fresh to slightly weathered limestone. The Rock Quality Designation (RQD) values in borehole BH16-3 was 57 percent indicating a rock quality of “good”. In borehole BH16-4 the RQD was 100% indicating a rock quality of “excellent” quality. Four samples of intact rock (obtained through coring) were tested in uniaxial compression. The results of the tests are presented below.

**Table 3 – Results of UCS Testing**

| Borehole No. | Depth (m) | Unit Weight (kN/m <sup>3</sup> ) | UCS (MPa) |
|--------------|-----------|----------------------------------|-----------|
| BH16-3       | 4.4       | 26.3                             | 112       |
| BH16-3       | 5         | 26.6                             | 96        |
| BH16-4       | 3.7       | 26.6                             | 85        |
| BH16-4       | 4.6       | 26.5                             | 85        |

## 3.2 GROUNDWATER CONDITIONS

In all the boreholes seepage was noted at the base of borehole upon completion of drilling. Piezometers were installed within all the boreholes, save borehole BH16-3. Groundwater levels were measured on February 9, 2016 (twelve days after drilling) and were found to be 0.3 m to 1.9 m below the existing surface elevation. The measured groundwater levels are presented in the table below. The piezometer in borehole BH16-5 was not read as it was inaccessible at the time of the investigation.

**Table 4 – Groundwater levels**

| <b>Borehole No.</b> | <b>Water level (m)</b> |
|---------------------|------------------------|
| BH16-1              | 1.9                    |
| BH16-2              | 1.0                    |
| BH16-4              | 0.3                    |
| BH16-6              | 0.9                    |

### **3.3**

#### **SUMMARY**

A summary of the soil conditions encountered at along the proposed parking lot locations are presented in the table below.

**Table 5 – Simplified Stratigraphy and Groundwater Elevations**

| Borehole | Simplified Stratigraphy (Depth in metres) |          |              |             |               | Water level | Notes                                       |
|----------|---|----------|--------------|-------------|---------------|-------------|---|
|          | Asphalt                                   | Topsoil  | Road Base    | Clayey Silt | Bedrock Cored |             |   |
| BH16-1   | 0 - 0.05                                  | --       | 0.05 - 0.29  | 0.29 - 4.4  | --            | 1.9         | Borehole terminated at 4.4 m                |
| BH16-2   | --  | 0 - 0.18 | --           | 0.18 - 4.4  | --            | 1.0         | Borehole terminated at 4.4 m                |
| BH16-3   | --  | 0 - 0.17 | --           | 0.17 - 4.1  | 4.1 - 5.6     | --          | Auger refusal at 4.1 m. Switch to NQ coring |
| BH16-4   | --  | 0 - 0.15 | --           | 0.15 - 3.5  | 3.5 - 5.0     | 0.3         | Auger refusal at 3.5 m. Switch to NQ coring |
| BH16-5   | 0 - 0.065                                 | --       | 0.065 - 0.43 | 0.43 - 4.4  | --            | --          | Borehole terminated at 4.4 m                |
| BH16-6   | 0 - 0.08                                  | --       | 0.08 - 0.56  | 0.56 - 4.4  | --            | 0.9         | Borehole terminated at 4.4 m                |

# 4 RECOMMENDATIONS

## 4.1 GENERAL

This section of the report provides engineering guidelines on the geotechnical design aspects of the project based on our interpretation of the available information described herein and our understanding of the project requirements. Contractors bidding on or undertaking the works should examine the factual results of the investigation, satisfy themselves as to the adequacy of the factual information for construction, and make their own interpretation of the factual data as it affects their proposed construction techniques, schedule, safety, and equipment capabilities.

## 4.2 FROST PROTECTION

The depth of frost in the area may be assumed to be 1.5 m. Water services should have a minimum cover of 1.7 m in accordance with Utilities Kingston standard drawings. Sewer services constructed in the same trench would typically be installed lower than the water service and would therefore also have a minimum of 1.7 m cover. If these depths cannot be accommodated then insulation may be considered in place of earth cover.

The soils within the frost depth are topsoil, granular road base and clayey silt. The granular road base is considered to have a low susceptibility to frost heave. The clayey silt and the topsoil are considered to be frost susceptible.

## 4.3 SEISMIC SITE CLASSIFICATION

Based on the borehole information the site may be assumed to be Class 'C' for seismic site response.

## 4.4 BEDDING, COVER AND BACKFILL

Bedding for site services should consist of OPSS Granular 'A' compacted to 95% SPMDD in layers not exceeding 150 mm loose thickness. Bedding for the various services should therefore be the greater of 150 mm or 0.15 times the diameter of the pipe but never greater than 300 mm. Any loose or disturbed subgrade soils should be removed and replaced with additional compacted granular fill prior to the placement of the bedding layer.

Cover for the services should also consist of OPSS Granular 'A' compacted to 95% SPMDD. Cover should extend to a minimum of 300 mm above the pipe and 300 mm laterally between the pipe and the trench walls.

The use of clear stone as a bedding or cover material is not recommended as the finer particles of the native soils and backfill may migrate into the voids of the clear stone, resulting in loss of pipe support.

Backfill above the minimum cover depth may include suitable portions of the existing soils or approved imported fill material. To the extent possible, backfill in the frost zone should be made to match the existing soils exposed in the excavation to minimize the potential for differential frost heave. Both the native and imported backfill materials should be approved by the contract administrator prior to reuse. All backfill should be free of frozen soils, cinders, ash, organic matter, cobbles and boulders over 150 mm diameter and other deleterious material.

Backfill should be placed in uniform layers not exceeding 200 mm in loose thickness and compacted to 95% SPMDD at a water content within +/- 2% of the soils optimum water content. Failure to properly moisture condition backfill soils will likely lead to difficulty achieving the required compaction.

## 4.5 PAVEMENT DESIGN

The following table provides a typical pavement structures for light duty roads/parking lots and heavy duty vehicle access and is based on experience with similar projects (and conservatively allows for clayey silt subgrade soil).

**Table 6: Recommended Pavement Structure Thickness**

| Pavement Layer           | Light Duty Roads and Parking Areas | Heavy Duty Access Roads       |
|--------------------------|------------------------------------|-------------------------------|
| Asphaltic Concrete       | 40 mm HL3<br>50 mm HL8 or MDB      | 50 mm HL3<br>70 mm HL8 or MDB |
| OPSS Granular A Base     | 150 mm                             | 150 mm                        |
| OPSS Granular B Sub-Base | 300 mm                             | 450 mm                        |

Traffic data has not been provided at this stage, however a Traffic Category of Level B is assumed to be adequate for a low-volume road. The asphaltic cement should be PG 58-34.

All tie-ins should include frost tapers between the existing pavement structures and the new pavement. Longitudinal connections with the existing pavement structure should be milled back a distance of 300 mm and a depth of 30 mm. A tack coat should be provided and the new surface course asphaltic concrete placed over the milled surface to form the new pavement joint.

### 4.5.1 COMPACTION

The granular base and sub-base materials should be uniformly compacted to 100 percent SPMDD using suitable vibratory compaction equipment. Compaction of the asphaltic concrete should be in accordance with City of Kingston and OPSS specifications.

The above pavement design is based on the assumption that the subgrade has been adequately prepared. If localized organics or soft soils are encountered it may be necessary to sub-excavate and replace with additional granular fill. All pavement subgrades should be reviewed by WSP during construction prior to placement of granular subbase.

The most severe loading conditions on paved areas and subgrades may occur during construction. Consequently, special provisions such as restricted access lanes, half-loads during paving, etc. may be required, especially if construction is carried out during unfavourable weather conditions.

## 4.6 CONSTRUCTION CONSIDERATIONS

### 4.6.1 CONSTRUCTION DEWATERING

Water level observations were made during drilling and in the open boreholes at the completion the drilling operations and no signs of seepage or water accumulation were noted. It is expected that seepage into a shallow excavation (<3 m in depth) can be managed using properly filtered sumps. In

the event that larger or deeper excavations are required then additional dewatering or more complex excavation support may be required and guidance if required can be provided during detailed design.

#### 4.6.2 TEMPORARY EXCAVATIONS

All excavations should be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). Part III of Ontario Regulation 213/91 deals with excavations.

The soils at the site include granular road base, and native clayey silt. The granular materials and the clayey silt can be classified as Type 3 Soil above the groundwater level (or depth of dewatering) and Type 4 soils below the groundwater level (or depth of dewatering). These classifications must be reviewed and confirmed by a qualified person during excavation. Provided that groundwater lowering measures are used (if required) then side slopes should be stable in the short term at 1 horizontal to 1 vertical within the fill materials and the clayey silt.

Alternatively, excavations within the overburden soil could be excavated near vertical with all manual labour carried out within a fully braced steel trench box, which would minimize the width of the excavation. The use of a trench box will not eliminate the potential for disturbance outside the trench box limits; however good construction practices using trench boxes can limit the potential zone of disturbance to within about 0.5 metres of the outside of the trench box walls. Existing utilities within this zone of disturbance may be affected by the works and suitable precautions should be taken to support/protect the existing infrastructure.

Stockpiling of soil beside the excavations should be avoided; the weight of the stockpiled soil could lead to instability of both braced and unsupported excavations.

All excavated surfaces should be kept free of frost, water, etc. during the course of construction. All excavated surfaces should be inspected by a qualified geotechnical engineer who is familiar with the findings of this investigation and the design and construction of similar structures.

#### 4.6.3 WINTER CONSTRUCTION

In the event that construction is required during freezing temperatures, the underlying native clayey silt is frost susceptible below the footings and culvert piping should be protected immediately from freezing using straw, propane heaters, polystyrene insulation, insulated tarpaulins, or other suitable means that prevent the underlying silty clay from freezing, which could cause significant frost heave.

# 5

## CLOSURE

The Limitations of Report, as presented in Appendix E, are an integral part of this report.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

**WSP Canada Inc.**

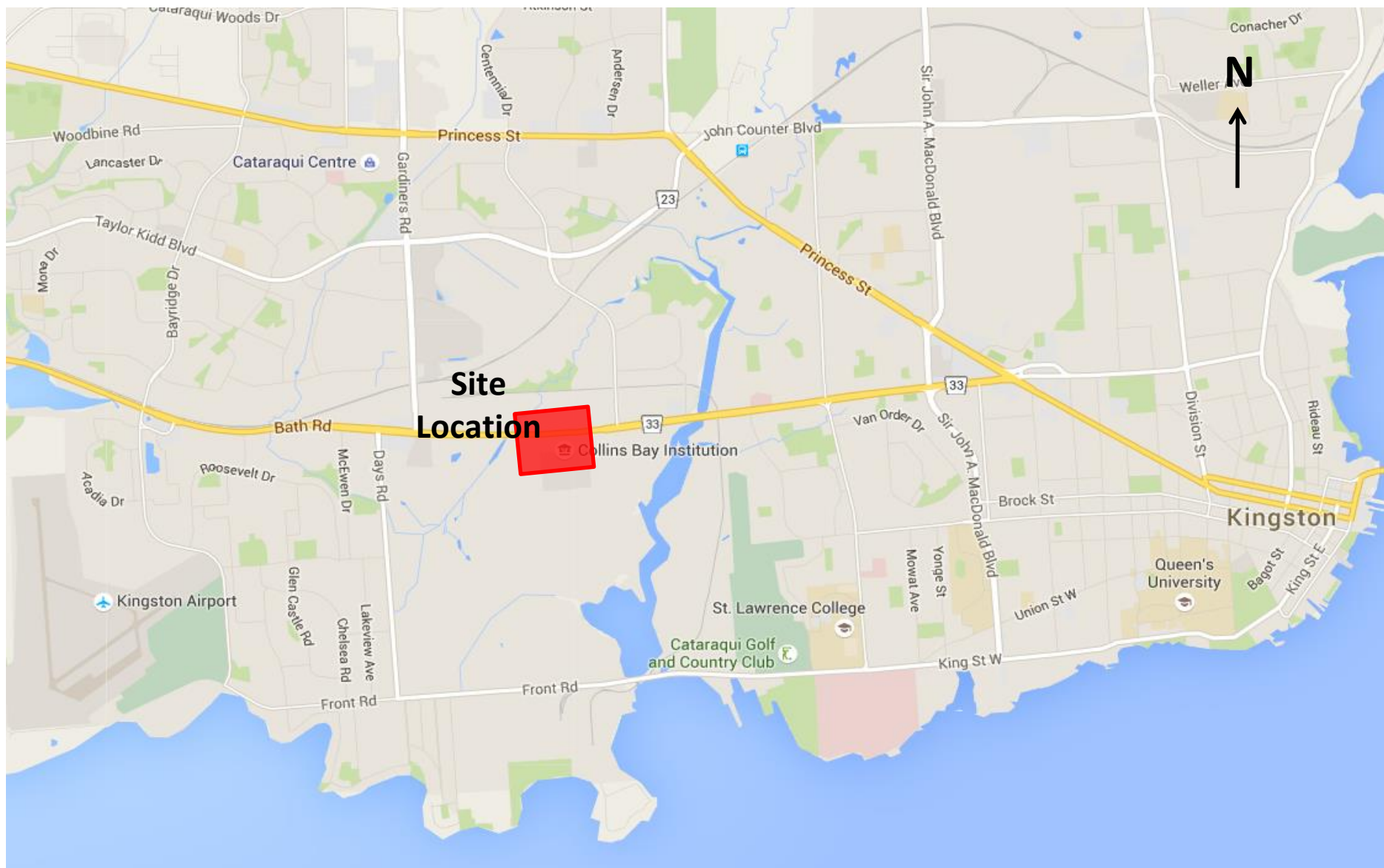
Prepared By:  
Daniel Wall, B.Eng., E.I.T.


Reviewed By:  
Chris Hendry, M.Eng., P.Eng.  
Senior Geotechnical Engineer

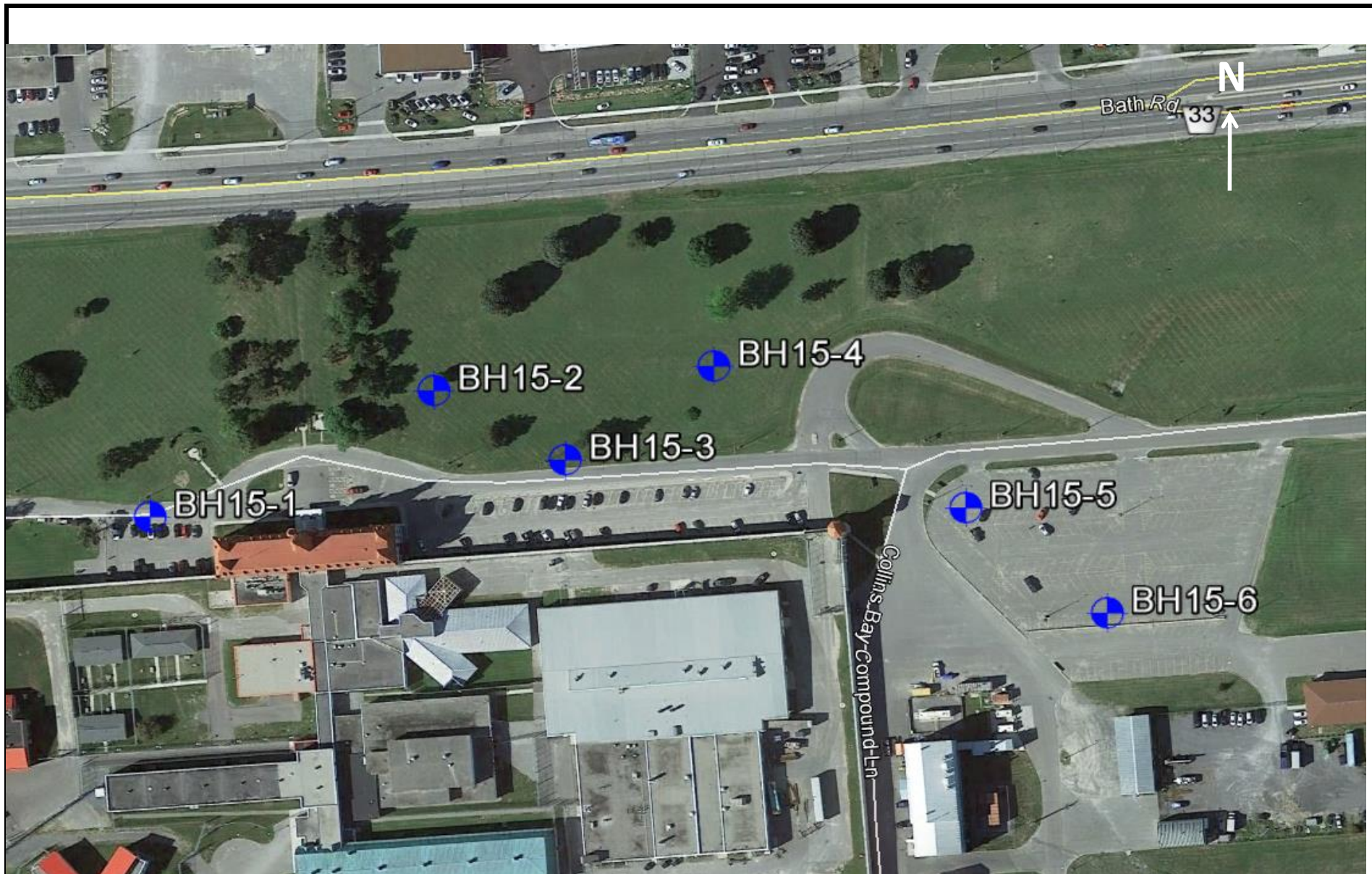
# Appendix A


**DRAWINGS**





|   |              |                           |          |
|---|--------------|---------------------------|----------|
| Client: Public Works and Government Services Canada                                   |              | Title: Site Location Plan |          |
| Project#:   | 141-14303-10 | DWG #:                    | A-1      |
| Drawn:  | DW           | Approved:                 | CH       |
| Date:   | January 2016 | Scale:                    | N. T. S. |
| Size:   | Letter       | Rev:                      | 0        |
|  |              |                           |          |



|   |                 |   |  |
|---|-----------------|---|--|
| Client: Public Works and Government Services Canada |                 | Title: Borehole Location Plan   |  |
| Project#: 141-14303-10                              | DWG #: A-1      | Project: Geotechnical Investigation – CBI Parking Lots                                |  |
| Drawn: DW   | Approved: CH    |   |  |
| Date: January 2016                                  | Scale: N. T. S. |   |  |
| Size: Letter  | Rev: 0          |  |  |

# Appendix B

BOREHOLE LOGS  
CORE PHOTOS





# LOG OF BOREHOLE 16-1

Project: CBI parking lots  
Client: PWGSC  
Project Location: Collins Bay Institution Kingston, ON  
Datum: n/a  
BH Location: See borehole location plan

**DRILLING DATA**  
Rig Type:  
Method: Hollow Stem Auger  
Borehole Diameter: 203 mm  
Core Diameter:

Project No.: 141-14303-10  
Date Started: 1/25/2016  
Supervisor:  
Reviewer:

| SOIL PROFILE         |             |             | SAMPLES |      |                    | GROUND WATER<br>CONDITIONS | ELEVATION | DYNAMIC CONE PENETRATION<br>RESISTANCE PLOT |    |    |    |     | POCKET PEN<br>(Cu) (kPa) | NATURAL UNIT WT<br>(kN/m³) | REMARKS<br>AND<br>GRAIN SIZE<br>DISTRIBUTION<br>(%) |                                    |                                     |                                   |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
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| (m)<br>ELEV<br>DEPTH | DESCRIPTION | STRATA PLOT | NUMBER  | TYPE | "N" BLOWS<br>0.3 m |                            |           | SHEAR STRENGTH (kPa)                        |    |    |    |     |                          |                            |   | PLASTIC<br>LIMIT<br>w <sub>p</sub> | NATURAL<br>MOISTURE<br>CONTENT<br>w | LIQUID<br>LIMIT<br>w <sub>L</sub> | WATER CONTENT (%) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
|                      |             |             |         |      |                    |                            |           | 20  | 40 | 60 | 80 | 100 |                          |                            |   |                                    |                                     |                                   |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | </ |

GROUNDWATER ELEVATIONS

GRAPH  
NOTES

+ 3, × 3: Numbers refer  
to Sensitivity

○ s=3% Strain at Failure

Sheet No. 1 of 1

Shallow/ Single Installation ▽ ▽ Deep/Dual Installation ▽ ▽



# LOG OF BOREHOLE 16-2

Project: CBI parking lots  
 Client: PWGSC  
 Project Location: Collins Bay Institution Kingston, ON  
 Datum: n/a  
 BH Location: See borehole location plan

**DRILLING DATA**  
 Rig Type:  
 Method: Hollow Stem Auger  
 Borehole Diameter: 203 mm  
 Core Diameter:

Project No.: 141-14303-10  
 Date Started: 1/25/2016  
 Supervisor:  
 Reviewer:

| SOIL PROFILE         |   |             | SAMPLES |      |                    | GROUND WATER<br>CONDITIONS | ELEVATION                      | DYNAMIC CONE PENETRATION<br>RESISTANCE PLOT                        |  |  |  |  | PLASTIC<br>LIMIT<br><br>w <sub>p</sub> | NATURAL<br>MOISTURE<br>CONTENT<br><br>w | LIQUID<br>LIMIT<br><br>w <sub>L</sub> | POCKET PEN.<br>(C <sub>u</sub> ) (kPa) | NATURAL UNIT WT<br>(kN/m <sup>3</sup> ) | REMARKS<br>AND<br>GRAIN SIZE<br>DISTRIBUTION<br>(%) |                   |  |  |
|----------------------|---|-------------|---------|------|--------------------|----------------------------|--------------------------------|--|--|--|--|--|--|---|---------------------------------------|--|---|---|-------------------|--|--|
| (m)<br>ELEV<br>DEPTH | DESCRIPTION   | STRATA PLOT | NUMBER  | TYPE | "N" BLOWS<br>0.3 m |                            |                                | SHEAR STRENGTH (kPa)   |  |  |  |  |  |   |                                       |  |   |   | WATER CONTENT (%) |  |  |
|                      |   |             |         |      |                    |                            |                                | ○ UNCONFINED      + FIELD VANE<br>● QUICK TRIAXIAL      × LAB VANE |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
| 0.0                  | TOPSOIL - 180 mm  |             | 1       | GRAB |                    |                            |                                |  |  |  |  |  |  |   |                                       |  | GR SA SI CL                             |   |                   |  |  |
| 0.2                  | CLAYEY SILT brown, moist, loose   |             |         |      |                    |                            | Cuttings                       |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
|                      |   |             | 2       | SS   | 6                  |                            | W. L. 1.0 mBGL<br>Feb 09, 2016 |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
|                      | - compact below 1.5 m in depth  |             | 3       | SS   | 16                 |                            |                                |  |  |  |  |  |  |   |                                       |  | 0 2 74 24                               |   |                   |  |  |
|                      |   |             | 4       | SS   | 12                 |                            | Sand                           |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
|                      |   |             |         |      |                    |                            | Screen                         |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
|                      |   |             | 5       | SS   | 16                 |                            |                                |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
|                      | - wet below 3.8 m in depth  |             | 6       | SS   | 17                 |                            | Cuttings                       |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
| 4.4                  | END OF BOREHOLE   |             |         |      |                    |                            |                                |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |
|                      | 1) Seepage noted at base of borehole upon completion of augering.<br>2) 25 mm piezometer installed at 4.4 m below the existing ground surface.<br>3) Date                      Groundwater Depth<br>2/9/2016                      1.0 m |             |         |      |                    |                            |                                |  |  |  |  |  |  |   |                                       |  |   |   |                   |  |  |

WSP SOIL LOG - OTTAWA GINT 141-14303-10.GPJ SPL.GDT 2/19/16

GROUNDWATER ELEVATIONS

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

Sheet No. 1 of 1

Shallow/ Single Installation Deep/Dual Installation



# LOG OF BOREHOLE 16-3

Project: CBI parking lots

Client: PWGSC

Project Location: Collins Bay Institution Kingston, ON

Datum: n/a

BH Location: See borehole location plan

## DRILLING DATA

Rig Type:

Method: Hollow Stem Auger

Borehole Diameter: 203 mm

Core Diameter: 96 mm

Project No.: 141-14303-10

Date Started: 1/25/2016

Supervisor:

Reviewer:

| SOIL PROFILE         |   |             | SAMPLES |      |                    | GROUND WATER CONDITIONS | ELEVATION | DYNAMIC CONE PENETRATION RESISTANCE PLOT |    |    |    |     | PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT |   |                | POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m <sup>3</sup> ) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) |
|----------------------|---|-------------|---------|------|--------------------|-------------------------|-----------|--|----|----|----|-----|---|---|----------------|------------------------|--------------------------------------|---|
| (m)<br>ELEV<br>DEPTH | DESCRIPTION   | STRATA PLOT | NUMBER  | TYPE | "N" BLOWS<br>0.3 m |                         |           | SHEAR STRENGTH (kPa)                     |    |    |    |     | W <sub>p</sub>                                | W | W <sub>L</sub> |                        |                                      |   |
| 0.0                  | TOPSOIL - 170 mm  |             |         |      |                    |                         |           | 20                                       | 40 | 60 | 80 | 100 |   |   |                |                        |                                      | GR SA SI CL                             |
| 0.2                  | CLAYEY SILT brown, moist, compact   |             | 1       | GRAB |                    |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |
|                      |   |             | 2       | SS   | 20                 |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |
|                      |   |             | 3       | SS   | 12                 |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |
|                      |   |             | 4       | SS   | 11                 |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |
|                      |   |             | 5       | SS   | 18                 |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |
|                      |   |             | 6       | SS   | 50/50 mm           |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |
| 4.1                  | LIMESTONE fresh, strong to very strong, very closely bedded with close to very closely spaced shale partings, grey, with moderately close to widely spaced horizontal joints<br><br>Run 1: 4.1 m - 5.6 m<br>TCR: 100%<br>SCR: 60%<br>RQD: 57% |             | 1       | CORE |                    |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |
| 5.6                  | END OF BOREHOLE<br><br>1) Auger refusal at 4.0 m. Borehole continued using NQ coring.<br>2) Seepage noted at base of borehole upon completion of augering.  |             |         |      |                    |                         |           |  |    |    |    |     |   |   |                |                        |                                      |   |

GROUNDWATER ELEVATIONS

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

Sheet No. 1 of 1

Shallow/ Single Installation Deep/Dual Installation



# LOG OF BOREHOLE 16-4

Project: CBI parking lots  
 Client: PWGSC  
 Project Location: Collins Bay Institution Kingston, ON  
 Datum: n/a  
 BH Location: See borehole location plan

**DRILLING DATA**  
 Rig Type:  
 Method: Hollow Stem Auger  
 Borehole Diameter: 203 mm  
 Core Diameter: 96 mm

Project No.: 141-14303-10  
 Date Started: 1/25/2016  
 Supervisor:  
 Reviewer:

| SOIL PROFILE         |   |             | SAMPLES |      |                    | GROUND WATER<br>CONDITIONS | ELEVATION | DYNAMIC CONE PENETRATION<br>RESISTANCE PLOT  |     | PLASTIC<br>LIMIT<br>w <sub>p</sub> | NATURAL<br>MOISTURE<br>CONTENT<br>w | LIQUID<br>LIMIT<br>w <sub>L</sub> | POCKET PEN.<br>(C <sub>u</sub> ) (kPa) | NATURAL UNIT WT<br>(kN/m <sup>3</sup> ) | REMARKS<br>AND<br>GRAIN SIZE<br>DISTRIBUTION<br>(%) |                   |    |    |
|----------------------|---|-------------|---------|------|--------------------|----------------------------|-----------|--|-----|------------------------------------|-------------------------------------|-----------------------------------|--|---|---|-------------------|----|----|
| (m)<br>ELEV<br>DEPTH | DESCRIPTION   | STRATA PLOT | NUMBER  | TYPE | "N" BLOWS<br>0.3 m |                            |           | SHEAR STRENGTH (kPa)<br>○ UNCONFINED      + FIELD VANE<br>● QUICK TRIAXIAL      × LAB VANE |     |                                    |                                     |                                   |  |   |   | WATER CONTENT (%) |    |    |
| 20                   | 40  | 60          | 80      | 100  | 25                 | 50                         | 75        | 100  | 125 | 25                                 | 50                                  | 75                                |  |   | GR  | SA                | SI | CL |
| 0.0                  | TOPSOIL - 150 mm  |             |         |      |                    |                            |           |  |     |                                    |                                     |                                   |  |   |   |                   |    |    |
| 0.2                  | SILT some clay, brown, moist, loose to compact  |             | 1       | GRAB |                    |                            |           | Cuttings<br>W. L. 0.3 mBGL<br>Feb 09, 2016   |     |                                    | ○                                   |                                   |  |   |   |                   |    |    |
|                      |   |             | 2       | SS   | 11                 |                            |           | Bentonite  |     |                                    | ○                                   |                                   |  |   |   |                   |    |    |
|                      |   |             | 3       | SS   | 9                  |                            |           |  |     |                                    | ○                                   |                                   |  |   |   |                   |    |    |
|                      | - wet below 2.3 m in depth  |             | 4       | SS   | 17                 |                            |           | Sand<br>Screen   |     |                                    | ○                                   |                                   |  |   | 0   | 1                 | 82 | 17 |
|                      |   |             | 5       | SS   | 50/<br>25<br>mm    |                            |           |  |     |                                    | ○                                   |                                   |  |   |   |                   |    |    |
| 3.5                  | LIMESTONE fresh, strong to very strong, very closely bedded with close to very closely spaced shale partings, grey, with close to moderately closely spaced horizontal joints<br><br>Run 1: 3.5 m - 5.1 m<br>TCR: 100%<br>SCR: 100%<br>RQD: 100%  |             | 1       | CORE |                    |                            |           | Bentonite  |     |                                    |                                     |                                   |  |   |   |                   |    |    |
| 5.0                  | END OF BOREHOLE<br><br>1) Auger refusal at 3.5 m. Borehole continued with NQ coring.<br>2) Seepage noted at base of borehole at completion of augering.<br>3) 25 mm piezometer installed at 4.4 m below the existing ground surface.<br>4) Date                      Groundwater Depth<br><br>2/9/2016                      0.3 m |             |         |      |                    |                            |           |  |     |                                    |                                     |                                   |  |   |   |                   |    |    |

WSP SOIL LOG - OTTAWA GINT 141-14303-10.GPJ SPLGDT 2/19/16

GROUNDWATER ELEVATIONS

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

Sheet No. 1 of 1

Shallow/ Single Installation ▽ ▽ Deep/Dual Installation ▽ ▽



# LOG OF BOREHOLE 16-5

Project: CBI parking lots

Client: PWGSC

Project Location: Collins Bay Institution Kingston, ON

Datum: n/a

BH Location: See borehole location plan

## DRILLING DATA

Rig Type:

Method: Hollow Stem Auger

Borehole Diameter: 203 mm

Core Diameter:

Project No.: 141-14303-10

Date Started: 1/25/2016

Supervisor:

Reviewer:

| SOIL PROFILE         |             |             | SAMPLES |      |                    | GROUND WATER CONDITIONS | ELEVATION | DYNAMIC CONE PENETRATION RESISTANCE PLOT |    |    |     |     | POCKET PEN (Cu) (kPa) | NATURAL UNIT WT (kN/m <sup>3</sup> ) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) |
|----------------------|-------------|-------------|---------|------|--------------------|-------------------------|-----------|--|----|----|-----|-----|-----------------------|--------------------------------------|---|
| (m)<br>ELEV<br>DEPTH | DESCRIPTION | STRATA PLOT | NUMBER  | TYPE | "N" BLOWS<br>0.3 m |                         |           | SHEAR STRENGTH (kPa)                     |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           | 20                                       | 40 | 60 | 80  | 100 |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           | FIELD VANE & Sensitivity                 |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           | LAB VANE                                 |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           | WATER CONTENT (%)                        |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           | 25                                       | 50 | 75 | 100 | 125 |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           | 25                                       | 50 | 75 |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |
|                      |             | </          |         |      |                    |                         |           |  |    |    |     |     |                       |                                      |   |

GROUNDWATER ELEVATIONS

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

Sheet No. 1 of 1

Shallow/ Single Installation ▽ ▽ Deep/Dual Installation ▽ ▽





# LOG OF BOREHOLE 16-6

Project: CBI parking lots  
 Client: PWGSC  
 Project Location: Collins Bay Institution Kingston, ON  
 Datum: n/a  
 BH Location: See borehole location plan

**DRILLING DATA**  
 Rig Type:  
 Method: Hollow Stem Auger  
 Borehole Diameter: 203 mm  
 Core Diameter:

Project No.: 141-14303-10  
 Date Started: 1/25/2016  
 Supervisor:  
 Reviewer:

| SOIL PROFILE         |             |             | SAMPLES |      |                    | GROUND WATER CONDITIONS | ELEVATION | DYNAMIC CONE PENETRATION RESISTANCE PLOT |    |    |     |     | POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m <sup>3</sup> ) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) |  |  |
|----------------------|-------------|-------------|---------|------|--------------------|-------------------------|-----------|--|----|----|-----|-----|------------------------|--------------------------------------|---|--|--|
| (m)<br>ELEV<br>DEPTH | DESCRIPTION | STRATA PLOT | NUMBER  | TYPE | "N" BLOWS<br>0.3 m |                         |           | SHEAR STRENGTH (kPa)                     |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           | 20                                       | 40 | 60 | 80  | 100 |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           | FIELD VANE & Sensitivity                 |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           | LAB VANE                                 |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           | WATER CONTENT (%)                        |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           | 25                                       | 50 | 75 | 100 | 125 |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           | 25                                       | 50 | 75 |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
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|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
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|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
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|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
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|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
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|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |
|                      |             |             |         |      |                    |                         |           |  |    |    |     |     |                        |                                      |   |  |  |

GROUNDWATER ELEVATIONS

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure


Sheet No. 1 of 1

Shallow/ Single Installation ▽ ▽ Deep/Dual Installation ▽ ▽

WSP SOIL LOG - OTTAWA GINT 141-14303-10.GPJ SPL.GDT 2/19/16



### Borehole BH16-3


|   |                 |   |  |
|---|-----------------|---|--|
| Client: Public Works and Government Services Canada |                 | Title: Core Photograph  |  |
| Project#: 141-14303-10                              | DWG #: B-1      | Project: Geotechnical Investigation<br>CBI Parking Lots                               |  |
| Drawn: DW   | Approved: CH    |   |  |
| Date: January 2016                                  | Scale: N. T. S. |  |  |
| Size: Letter  | Rev: 0          |   |  |



Run 1: 3.5 m - 5.0 m



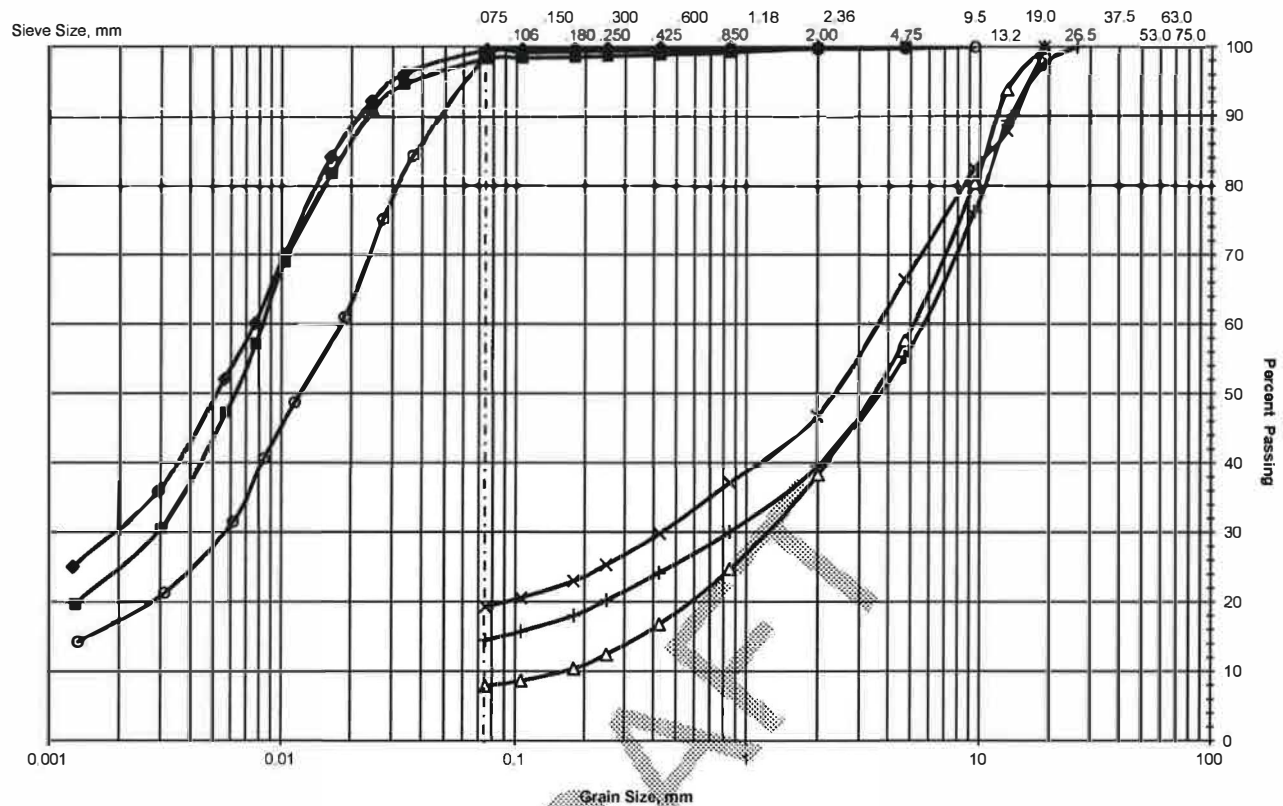
**Borehole BH16-4**

|   |                 |   |  |
|---|-----------------|---|--|
| Client: Public Works and Government Services Canada |                 | Title: Core Photograph  |  |
| Project#: 141-14303-10                              | DWG #: B-2      | Project: Geotechnical Investigation<br>CBI Parking Lots                               |  |
| Drawn: DW   | Approved: CH    |   |  |
| Date: January 2016                                  | Scale: N. T. S. |  |  |
| Size: Letter  | Rev: 0          |   |  |

# Appendix C

LABORATORY TESTING RESULTS

## GRAIN SIZE DISTRIBUTION



| CLAY and SILT                      | FINE | MEDIUM | COARSE | FINE   | COARSE |
|------------------------------------|------|--------|--------|--------|--------|
|                                    | SAND |        |        | GRAVEL |        |
| UNIFIED SOIL CLASSIFICATION SYSTEM |      |        |        |        |        |

| Location | Sample | Depth ( m ) | Legend |
|----------|--------|-------------|--------|
| BH 16-1  | GS-1   | 0.10 - 0.20 | △      |
| BH 16-2  | SS-3   | 1.52 - 2.13 | ■      |
| BH 16-4  | SS-4   | 2.29 - 2.90 | ○      |
| BH 16-5  | GS-1   | 0.10 - 0.20 | +      |
| BH 16-6  | GS-1   | 0.10 - 0.20 | x      |
| BH 16-6  | SS-5   | 3.05 - 3.66 | ◆      |

# Appendix D

**Explanation of Terms used in Report**

## Explanation of Terms Used in the Record of Boreholes

### Sample Type

|    |                       |
|----|-----------------------|
| AS | Auger sample          |
| BS | Block sample          |
| CS | Chunk sample          |
| DO | Drive open            |
| DS | Dimension type sample |
| FS | Foil sample           |
| RC | Rock core             |
| SC | Soil core             |
| SS | Spoon sample          |
| SH | Shelby tube Sample    |
| ST | Slotted tube          |
| TO | Thin-walled, open     |
| TP | Thin-walled, piston   |
| WS | Wash sample           |

### Penetration Resistance

#### Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

WH – Samples sinks under “weight of hammer”

#### Dynamic Cone Penetration Resistance, $N_d$ :

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to “A” size drill rods for a distance of 300 mm (12 in).

### Textural Classification of Soils

| Classification | Particle Size      |
|----------------|--------------------|
| Boulders       | > 200 mm           |
| Cobbles        | 75 mm - 200 mm     |
| Gravel         | 4.75 mm - 75 mm    |
| Sand           | 0.075 mm – 4.75 mm |
| Silt           | 0.002 mm-0.075 mm  |
| Clay           | <0.002 mm          |

### Coarse Grain Soil Description (50% greater than 0.075 mm)

| Terminology                     | Proportion |
|---------------------------------|------------|
| Trace                           | 0-10%      |
| Some                            | 10-20%     |
| Adjective (e.g. silty or sandy) | 20-35%     |
| And (e.g. sand and gravel)      | > 35%      |

### Soil Description

#### a) Cohesive Soils(\*)

| Consistency | Undrained Shear Strength (kPa) | SPT “N” Value |
|-------------|--------------------------------|---------------|
| Very soft   | <12                            | 0-2           |
| Soft        | 12-25                          | 2-4           |
| Firm        | 25-50                          | 4-8           |
| Stiff       | 50-100                         | 8-15          |
| Very stiff  | 100-200                        | 15-30         |
| Hard        | >200                           | >30           |

(\*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT “N” value
5. Pocket penetrometer

#### b) Cohesionless Soils

| Density Index (Relative Density) | SPT “N” Value |
|----------------------------------|---------------|
| Very loose                       | <4            |
| Loose                            | 4-10          |
| Compact                          | 10-30         |
| Dense                            | 30-50         |
| Very dense                       | >50           |

### Soil Tests

|                |  |
|----------------|--|
| w              | Water content  |
| w <sub>p</sub> | Plastic limit  |
| w <sub>l</sub> | Liquid limit   |
| C              | Consolidation (oedometer) test   |
| CID            | Consolidated isotropically drained triaxial test                                       |
| CIU            | consolidated isotropically undrained triaxial test with porewater pressure measurement |
| D <sub>R</sub> | Relative density (specific gravity, G <sub>s</sub> )                                   |
| DS             | Direct shear test  |
| ENV            | Environmental/ chemical analysis   |
| M              | Sieve analysis for particle size   |
| MH             | Combined sieve and hydrometer (H) analysis   |
| MPC            | Modified proctor compaction test   |
| SPC            | Standard proctor compaction test   |
| OC             | Organic content test   |
| U              | Unconsolidated Undrained Triaxial Test   |
| V              | Field vane (LV-laboratory vane test)   |
| γ              | Unit weight  |

# Appendix E

**Limitations of This Report**



## **LIMITATIONS OF REPORT**

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to SPL Consultants Limited at the time of preparation. Unless otherwise agreed in writing by SPL Consultants Limited, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

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We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.