PROJECT TITLE GRAVENHURST, ONTARIO
BEAVER CREEK MEDIUM (FENBROOK) INSTITUTION
SITE DEVELOPMENT AND PARKING EXPANSION
TENDER

PROJECT NUMBER R.079593.001

5PROJECT DATE 2016-06-14

END OF SECTION

Consultant for Review:

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ELECTRICAL

END OF SECTION

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Title and description of Work.

.2 Contract Method.

.3 Work sequence.

.4 Contractor use of premises.

.5 Owner occupancy.

1.2 PRECEDENCE

.1 Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 14 00 - Work Restrictions.

.3 Section 01 35 13 - Special Project Procedures for Correctional Service Canada Security Requirements.

1.4 MEASUREMENT PAYMENTS

.1 Unless otherwise directed, all the General Requirements specified in Division 01 herein shall not be subject to measurement and payment but shall be allowed for in the Contract Price.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises the removal and reconstruction of the main parking area at the Beaver Creek Institution, including lighting reconfiguration and miscellaneous site upgrades. Other related works include the construction of a new parking area off the firing range access road, the milling and resurfacing of the main road and secondary parking area, and the provision of new sidewalks, retaining wall, stormwater drainage upgrades and replacement of a section of sanitary sewer.

1.6 GENERAL BACKGROUND INFORMATION

.1 The Client, Correctional Services Canada, (CSC) in Gravenhurst, northern Ontario, is implementing a development plan to expand the parking capacity and improve parking facility as well as vehicular and pedestrian circulation for the Parking lot in Fenbrook, Medium Institution.

.2 The main purpose for this project is that in recent years, the Beaver Creek, minimum and Fenbrook Institutions Medium which are located on shared property within the town of Gravenhurst adjacent to each other, have experienced an increase in inmate and staff population levels as well as facility expansion. As a result of these changes, the parking demand has since swelled beyond the existing on-site parking capacity.

.3 Following an adequate evaluation and consideration process for the present and future demand for the expansion and development of the parking facility for the Medium Institution process, the following was established:
.1 Total parking spaces proposed: 253 parking spaces.
.2 Handicapped parking spaces: 6 parking spaces.
.3 Total parking spaces achieved: 259 parking spaces.

.4 The CSC overriding mandatory requirement for the implementation is that the car parking capacity within the existing parking lot shall be maintained during the implementation period of the project in order to maintain the car parking demand for visitors and businesses. To facilitate and achieve this requirement, multiple implementation phases will be adopted and generally as follows:
.1 Prior to the Construction Contract Award, CSC will on its own cost, develop a separate site in a separate location, for accommodating not less than Fifty (50) car parking spaces to be allocated to CSC own regular staff. This will ensure that the staff parking will not be impeded during the construction period of this project and will ensure that the staff parking is maintained during the construction period of this project.
.2 Phased construction in adequate sequence shall be developed in the design to provide the sequence which the Contractor will follow and which shall ensure that the parking capacity is maintained daily as required and the project is completed on the Completion Date defined in the contract.

1.7 CONTRACT METHOD

.1 Construct work under lump sum and unit price contract.

1.8 WORK IMPLEMENTATION SEQUENCE

.1 The Client's general approval of the proposed plan is based on an implementation sequence and procedure, unless otherwise directed, as follows:

.1 The work shall be implemented in an adequate sequence and carried out in eight (8) phases or stages and specifically on the basis that 50 (fifty) car spaces for the Client staff are excluded from the scope of work for this project.

.2 Due to the parking capacity requirements and the mandatory sequence of implementation, it is to be noted that the asphaltic concrete paving shall be carried out only on weekends and that will include both the base course (HL8) and the surface course (HL4).

.3 Pavement marking for the whole parking lot shall be carried out on weekends only and implemented at a later suitable date and prior to the final completion of the work and as directed.

.4 During the construction phases and prior to Completion, the Contractor shall facilitate the transitional and safe parking of cars as defined and required in the phases of work herein and shall carry out all preparatory work required and make good all surfaces disturbed.

.5 Dependent on the sequence of construction in association with the phases of work defined herein, the Contractor shall take into consideration that parking of cars will be required to be made on newly completed asphaltic concrete base course, newly completed asphaltic concrete surface courses and that prior to the application of the pavement marking and also that parking of cars will be required to be made on milled asphaltic concrete pavement and prior to asphaltic concrete paving.

1.9 PROPOSED PHASES OF WORK

.1 Proposed Phases of the Work: Unless otherwise directed, the construction work shall be implemented in eight (8) phases and generally as follows:

.1 PHASE 1: Development of a new area adjacent to the road to the Firing Range. Work to be generally completed up to and including the granular base and subbase excluding asphaltic concrete paving and which is capable to accommodate not less than 36 car spaces.

.2 PHASE 2: Development of a segment of the existing parking area including the removal and disposal of existing pavement, excavation and earthwork and providing granular base and subbase courses excluding asphaltic concrete paving and including all subsidiary work to accommodate not less than 66 car spaces. Total spaces that can be made available at this phase are 36 + 66 = 102 car spaces.

.3 PHASE 3: Development of a segment of the existing parking area including the removal and disposal of existing pavement, excavation and earthwork and providing granular base and subbase courses excluding asphaltic concrete paving and including all subsidiary work to accommodate not less than 98 car spaces. Total spaces that can be made available at this phase are 36 + 66 + 98 = 200 car spaces.

.4 PHASE 4 - ONLY ON WEEKENDS: Implementation and completion of the asphaltic concrete base and surface courses, as required for Phases 1, 2, and 3. Number of parking spaces available remains at 200 car spaces. Reference to be made to Paragraph 1.8 for the sequence of asphaltic concrete paving.

.5 PHASE 5: Milling of the existing asphaltic concrete surfaces in the existing parking area and carrying out all subsidiary work to accommodate 53 parking spaces excluding asphaltic concrete paving. Total spaces that can be made available at this phase are 36 +66 + 98 + 53 = 253 car spaces.

.6 PHASE 6: Milling of the existing asphaltic concrete surfaces in the circulation areas of the existing parking lot including all subsidiary work to accommodate access road and other circulation area excluding asphaltic concrete paving.

.7 PHASE 7: ONLY ON WEEKENDS: Implementation and completion of the asphaltic concrete surface course, as required for Phases 5 and 6. Number of parking spaces made available are 253 car spaces. Reference to be made to Paragraph 1.8 for the sequence of asphaltic concrete paving.

.8 PHASE 8: ONLY ON WEEKENDS: Implementation and completion of pavement markings as required for phases 1, 2, 3, 5, and 6. Reference to be made to Paragraph 1.8 for the sequence of pavement markings.

1.10 GENERAL PHASING NOTES

.1 Construct Work to accommodate Owner's continued use of the existing site car parking to its full extent during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

.3 Construction Phasing

.1 Prior to construction starting, the Owner will provide temporary parking spaces for employees. This work will be completed by their own forces and as such, is not part of this Contract.

.2 The parking lot is in operation 24 hours a day, seven days a week. Contractor shall not impact the facility's operations throughout the duration of the Project. Weekend work to be scheduled, as required.

.3 The work shall take place in eight (8) phases as prescribed on the contract drawings and shall be carried out in numerical order.

.4 Contractor to provide all necessary signs, barriers, and fences to delineate and separate the working phase from public access. The Contractor shall control the work zones.

.5 Contractor shall provide and maintain adequate ingress/egress ramping, as required, that is suitable for passenger vehicle movements at all access/phase interfaces in use during phasing.

.6 A granular base is acceptable for parking areas pending asphalt installation.

.7 The Contractor shall maintain one lane of traffic access to the firing range during construction. The firing range is located south of Phase 1.

.8 Contractor to make good all disturbed granular surfaces prior to paving.

.9 Preparatory work for and asphalt installation work shall take place in two (2) phases only and shall be completed as weekend work. Contractor to provide CSC a minimum of 72 hours notice of any weekend work.

.10 Contractor shall maintain access to security entrance at all times.

.11 Maintain emergency access and control.

.12 Refer to Drawing C001 in the contract documents for specific detail of the phasing plan.

1.11 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for Work to allow:

.1 Owner occupancy as detailed in this specification.

.2 fer to Contract Drawing C001 for construction laydown area location.

.2 Co-ordinate use of premises under direction of Departmental Representative.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Refer to Section 01 14 00 and Section 01 35 13 for security requirements for access to the Work Site.

1.12 OWNER OCCUPANCY

.1 Owner will occupy the premises during entire construction period for execution of normal operations.

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

1.13 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING FACILITIES

.1 Execute work with least possible interference or disturbance to site operations occupants and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.14 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda and amendments.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field 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

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas 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. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Refer to the Requirements identified in Section 01 35 13.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING FACILITIES

.1 Execute work with least possible interference or disturbance to site operations, occupants and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

.2 Refer to Phasing Requirements as indicated in Section 01 11 00 and on the Contract Drawings.

1.4 EXISTING SERVICES

.1 Notify, Departmental Representative and 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 notice for necessary interruption service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to site operations and pedestrian and vehicular traffic.

.3 Provide alternative routes for 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 temporary services to maintain critical facility building and tenant systems.

.7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.10 Record locations of maintained, re-routed and abandoned service lines.

.11 Construct barriers in accordance with Section 01 56 00.

1.5 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.

.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.

.4 Deliver materials outside of peak traffic hours unless otherwise approved by Departmental Representative.

1.6 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances: to Section 01 35 13.

.1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
.2 Obtain requisite clearance, as instructed, for each individual required to enter premises.

.3 Site Access: Normal working hours 8:00am to 4:00pm.
.1 Contractor superintendent shall be present at all times during construction. All contractor employees shall sign-in and out daily at security desk.
.2 Contractor may work after hours only with pre-arrangement with Departmental Representative. Owner site representative will be required and security deployed for all after hours work.

1.7 SMOKING ENVIRONMENT

.1 There is no smoking allowed on site except in identified smoking area(s) as designated by CSC.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified within the technical specification sections.

1.2 APPOINTMENT AND PAYMENT

.1 Departmental Representative has appointed and will pay for services of testing laboratory except follows:
.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
.2 Inspection and testing performed exclusively for Contractor's convenience.
.3 Tests specified to be carried out by Contractor under supervision of Departmental Representative.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:
.1 Provide access to Work for inspection and testing.
.2 Facilitate inspections and tests.
.3 Make good Work disturbed by inspection and test.
.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
.1 Departmental Representative will perform verification testing of the proposed granular materials for Standard Proctor determination. Contractor to provide samples, as necessary.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

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, affected parties not in attendance and Departmental Representative.

.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 business days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:
.1 Appointment of official representative of participants in the Work.
.2 Schedule of Work: in accordance with Section 01 32 16.

.3 Schedule of submission of shop drawings, samples, colour chips. 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 Delivery schedule of specified equipment.

.6 Site security in accordance with Section 01 56 00 and Section 01 35 13.

.7 Health and safety in accordance with Section 01 35 29.

.8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.9 Submission of Record drawings and specifications in accordance with Section 01 33 00.

.10 Maintenance manuals in accordance with Section 01 78 00.

.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.

.12 Monthly progress claims, administrative procedures, photographs, hold backs.

.13 Appointment of inspection and testing agencies or firms.

.14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work schedule progress meetings bi-weekly.

.2 Contractor, major Subcontractors involved in Work, Departmental Representative are to be in attendance.

.3 Notify parties minimum five business days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three days after meeting.

.5 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.

.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.

END OF SECTION

PART 1 - GENERAL

1.1 ELECTRONIC COPY

.1 Submit electronic, colour, digital photography in jpg format, minimum 12.20 Megapixels (4272 x 2848) resolution.

.2 Identification: name and number of project and date of exposure indicated.

.3 Frequency: monthly with progress statement, framing and services before concealment and as directed by Departmental Representative.

1.2 VIDEO

.1 Submit colour, digital, HD format.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit to Departmental Representative within 5 working days of Award of Contract, Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
.1 Award.
.2 Shop Drawings.
.3 Mobilization.
.4 Demolition.
.5 Parking lot construction/reconstruction by phase including the following sub-tasks:
.1 Sewer Replacement.
.2 Stormwater Conveyance Upgrades.
.3 Lighting Upgrades.
.4 Site Reinstatement.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

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.

.11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format. Forward PDF, MS Word, MS Excel, MS Project and Autocad dwg files on USB drive compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada, where required.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 5 business days for Departmental Representative's review of each submission.

.5 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.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter 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.

.8 Submissions 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 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.

.9 After Departmental Representative's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit 3 hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .2 Testing must have been within 3 years of date of contract award for project.

.12 Submit 3 hard copies and one electronic copy of Operation and Maintenance Data 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.

.15 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, electronic copy 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 Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PWGSC 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 CERTIFICATES AND TRANSCRIPTS

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 PURPOSE

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

1.2 DEFINITIONS

.1 "Contraband" means:

.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, $25 when possessed by an inmate without prior authorization.

.7 Any item not described in paragraphs 1.2.1.1 to 1.2.1.6 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.

.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.
.1 For this Project, the limits of construction are generally bound by the paved area surrounding the Stores Building. This is not located within the security areas of the institution.

1.3 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 the institution's 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 institutional personnel in ensuring that security requirements are observed by all Construction Employees.

1.4 CONSTRUCTION EMPLOYEES

.1 Submit to the Director a list of the names with date of birth of all Construction Employees to be employed on the construction site and a security clearance form for each employee.

.2 Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC Institutions are not valid at this Institution.

.3 The Director may require that facial photographs may be taken of Construction Employees and these photographs may be displayed at appropriate locations in the Institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all Construction Employees. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the Construction Employees' clothing at all time while Construction Employees are in the institution.

.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.

.5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
.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.

1.5 VEHICLES

.1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.

.2 The Director may limit at any time the number and type of vehicles allowed within the Institution.

.3 Drivers of delivery vehicles for material required by the project will not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The Director may require that these vehicles be escorted by Institutional Staff or Commissionaires while in the Institution.

.4 If the Director permits trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter shall be locked when not in use.

1.6 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.

1.7 SHIPMENTS

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

1.8 TELEPHONES

.1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the Institution unless prior approval of the Director is received.

.2 The Director will ensure that approved telephones, facsimile machine and computers with internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an internet connection to unauthorized personnel.

.3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.

.4 The Director may approve but limit the use of two way radios.

1.9 WORK HOURS

.1 Work hours within the Institution are: Monday to Friday 08:00am to 04:00pm

.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.

1.10 OVERTIME WORK

.1 No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such 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.

1.11 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.

.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.

1.12 PRESCRIPTION DRUGS

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

1.13 SMOKING RESTRICTIONS

.1 Contractors and construction employees are not permitted to smoke inside correctional facilities or outdoors within the perimeter of a correctional facility and must not possess unauthorized smoking items within the perimeter of a correctional facility.

.2 Contractors and construction employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.

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

1.14 CONTRABAND

.1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on Institutional 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 Institution for the duration of the construction.

.4 Presence of arms and ammunition in vehicles of Contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

1.15 SEARCHES

.1 All vehicles and persons entering Institutional property may be subject to search.

.2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of Contraband or unauthorized items, he/she may order that person to be searched.

.3 All employees entering the Institution may be subject to screening of personal effects for traces of Contraband drug residue.

1.16 ACCESS TO AND REMOVAL FROM INSTITUTION PROPERTY

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

1.17 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 08:00 am to 04:00pm.

.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.

1.18 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

.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.

.2 However, notwithstanding paragraph above, the Director may:

.1 Prohibit or restrict access to any part of the Institution.

.2 Require that in certain areas of the Institution, either during the entire construction project or at certain intervals, Construction Employees only be allowed access when 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.

1.19 SURVEILLANCE AND INSPECTION

.1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.

.2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among Construction Employees and maintained throughout the construction project.

1.20 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 occurring within the Institution. 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.

1.21 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.

.2 It is forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this Contract.

1.22 COMPLETION OF CONSTRUCTION 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 in the Institution as part of the construction contract.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA): Canada
.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Building Code 2010 (NBC):
.1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.3 National Fire Code 2010 (NFC):
.1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

.4 Province of Ontario:
.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2005
.2 O. Reg. 490/09, Designated Substances.
.3 Workplace Safety and Insurance Act, 1997.
.4 Municipal statutes and authorities.

.5 Treasury Board of Canada Secretariat (TBS):
.1 Treasury Board, Fire Protection Standard April 1, 2010.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit 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 operation found in work plan.
.3 Measures and controls to be implemented to address identified safety hazards and risks.
.1 Emergency and Fire Evacuation Route: The Contractor shall obtain training on procedures of evacuating the site under emergency and/or fire situations. Contractor training and sign-off is required prior to initiating site work.
.4 Contractor's and Sub-contractors' Safety Communication Plan.

.5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 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 names of personnel and alternates responsible for site safety and health.

.6 Submit records of Contractor's Health and Safety meetings when requested.

.7 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, bi-weekly.

.8 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.9 Submit copies of incident and accident reports.

.10 Submit Material Safety Data Sheets (MSDS).

.11 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

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.

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 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
.1 Silica in concrete.
.2 Sanitary Sewage.

1.8 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 will respond in writing, where deficiencies or concerns are noted and will request re-submission with correction of deficiencies or concerns.

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

1.10 RESPONSIBILITY

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

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

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act for the Province of Ontario.

1.11 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.

1.12 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
.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.

1.13 CORRECTION OF NON-COMPLIANCE

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

.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.

1.14 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.15 POWER ACTUATED DEVICES

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

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

.3 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Annex B - Environmental Effects Evaluation Report.

1.2 GENERAL

.1 Refer to Annex B - Environmental Effects Evaluation Report for site specific environmental concerns.

1.3 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit 2 copies of WHMIS MSDS.

.3 Contractor to submit an Environmental Protection Plan for review and approval by Departmental Representative. The plan is to provide an overview of all known or potential environmental issues identified in the specification and the appended Environmental Effects Evaluation Report and the Contractor's proposed mitigation measures during construction.

.4 Contractor to submit Erosion and Sediment Control Plan as detailed in paragraph 1.6 below.

1.5 FIRES

.1 Fires and burning of rubbish on site is not permitted.

1.6 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Provide temporary drainage and pumping required to keep excavations and site free from water.

.3 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.7 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Protect 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 minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
.1 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 POLLUTION CONTROL

.1 Maintain temporary erosion control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
.1 Provide temporary enclosures where directed by Departmental Representative.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.9 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.
.1 Take action only after receipt of written 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 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

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

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

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

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.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 as directed by the Departmental Representative.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's, other than those identified in Section 01 35 29 are discovered in course of work.

1.3 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements of soil compaction, concrete, asphalt and other tests as directed by Departmental Representative.

.2 Tests and mix designs.

1.2 RELATED SECTIONS

.1 Section 01 29 83 - Payment Procedures For Testing Laboratory Services.

1.3 INSPECTION

.1 Allow Departmental Representative and Correction Services Canada Representatives 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 will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.4 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.

1.5 PROCEDURES

.1 Notify appropriate agency and in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 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 will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.7 REPORTS

.1 Refer to section 01 33 00.

.2 Submit copies of inspection and test reports to Departmental Representative.

.3 Provide copies to subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.2 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water. Any water pumped from the construction site shall be filter to remove sediments prior to entering sewers or the natural environment using established best management Erosion and Sediment Control practices.

1.3 WATER SUPPLY

.1 Contractor to provide own supply of potable water for use.

.2 Water required for use during construction can be accessed by on-site hydrants at the institution. Contractor shall cover any and costs incurred for installation, connection, maintenance, and removal of the connection.

1.4 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA-O121-08(R2013), Douglas Fir Plywood.
.3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
.4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Refer to Contract Drawings for staging area location.

.3 Identify areas which have to be gravelled to prevent tracking of mud.

.4 Indicate use of supplemental or other staging area. Additional staging area requirements to be coordinated with CSC.

.5 Provide construction facilities in order to execute work expeditiously.

.6 Remove from site all such work after use.

1.4 HOISTING

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists and cranes to be operated by qualified operator.

1.5 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.6 CONSTRUCTION PARKING

.1 Limited parking will be permitted on site provided it does not disrupt performance of Work nor encumber parking for facilities staff.

.2 Provide and maintain adequate access to project site.

1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.8 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.9 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.8 Dust control: adequate to ensure safe operation at all times.

1.10 CLEAN-UP

.1 Clean up in accordance with Section 01 74 11.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.2 HOARDING

.1 Provide temporary site enclosure when performing site work.

.2 Erect temporary site enclosure using modular freestanding fencing: galvanized, minimum 1.8 m high, chain link or welded steel mesh, pipe rail.

1.3 ACCESS TO SITE

.1 Provide and maintain access roads and sidewalk crossings as may be required for access to Work.

1.4 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.5 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 45 00 - Quality Control.

1.2 REFERENCES

.1 Within text of specifications, reference may be made to reference standards.

.2 Conform to these standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
.1 The cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.4 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.5 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online.

1.3 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

1.4 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Amount or Contract Time.

1.5 METRIC SIZED MATERIALS

.1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.

.2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.

.3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.

.4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.

.5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.6 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.7 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.8 MANUFACTURER'S INSTRUCTIONS

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

.2 Notify Departmental in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Amount or Contract Time.

1.9 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.10 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants, pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Departmental Representative.

.4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

1.2 SURVEY REQUIREMENTS

.1 Establish lines and levels, locate and lay out, by instrumentation.

.2 Stake for grading, fill and asphalt.

.3 Establish lines and levels for site and electrical work.

1.3 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as indicated in the contract drawings and as directed by Departmental Representative.

1.4 LOCATION OF SERVICES

.1 Inform Departmental Representative of impending installation and obtain approval for actual location.

.2 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.5 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00.

.2 Submit written request in advance of alteration which affects:
.1 Structural integrity of elements of project.
.2 Efficiency, maintenance, or safety of operational elements.
.3 Visual qualities of sight-exposed elements.

.3 Include in request:
.1 Identification of project.
.2 Location and description of affected Work.
.3 Statement on necessity for alteration.

.4 Description of proposed Work, and products to be used.

.5 Effect on Work of Owner or separate contractor.

.6 Written permission of affected separate contractor.

.7 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during alteration.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of alteration means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Uncover Work to install ill-timed Work.

.3 Remove and replace defective and non-conforming Work.

.4 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.5 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.6 Restore work with new products in accordance with requirements of Contract Documents.

.7 Submit proposed materials, finishes and installation method to Departmental Representative for approval.

.8 Ensure any work completed on potable water lines follow construction procedures in accordance with AWWA C652-14 Standards.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 20.

.6 Remove waste material and debris from site and deposit in waste container at end of each working day.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.8 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by Others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Broom clean and wash exterior walks, steps and surfaces used during construction.

.8 Remove dirt and other disfiguration from exterior surfaces.

.9 Sweep and wash clean paved areas.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 CONSTRUCTION & DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and divert, waste destined for landfill to maximum extent possible. Target for this project is 60% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.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 Concrete block and portland cement concrete.
  - .2 Corrugated cardboard.
  - .3 Wood, not including painted or treated wood or laminated wood.
  - .4 Steel.

.3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.

.4 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested.

.5 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.

1.2 WASTE PROCESSING SITES

.1 Province of: Ontario.
- .1 Ministry of Environment and Energy: 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
- .2 Telephone: 800-565-4923 or 416-323-4321.
- .3 Fax: 416-323-4682.
- .4 Telephone: 416-657-2797.
- .5 Fax: 416-960-8053.

.2 Email: rco@rco.on.ca.

.3 Internet: http://www.rco.on.ca/.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule C - Government Chief Responsibility for the Environment:
.1 Ministry of Environment Address: St. Clair Avenue West, Toronto, ON, M4V 1P5.
.2 Telephone: 800-565-4923 or 416-323-4321.
.3 Fax: 416-323-4682.
.4 Telephone: 416-657-2797.
.5 Fax: 416-960-8053.

END OF SECTION

PART 1 - GENERAL

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
.1 Work has been completed and inspected for compliance with Contract Documents.
.2 Defects have been corrected and deficiencies have been completed.
.3 Certificates required by Authorities having jurisdiction have been submitted.
.4 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 As-built, samples, and specifications.

.2 Product data, materials and finishes, and related information.

.3 Operation and maintenance data.

.4 Warranties and bonds.

1.2 SUBMISSION

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of maintenance manuals and commissioning documentation in English.

.5 If requested, furnish evidence as to type, source and quality of products provided.

.6 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

1.3 FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide CAD drawings files in 1:1 scaled dwg format. Provide text files in MS Word or PDF, MS Excel and MS Project formats. Forward files on USB flash drive compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
.1 Date of submission; names,
.2 Addresses, and telephone numbers of Contractor with name of responsible parties;
.3 Schedule of products, indexed to content of volume.

.2 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

1.5 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Amendments and addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB flash drive compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

.7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.3 Field changes of dimension and detail.
.4 Changes made by change orders.
.5 Details not on original Contract Drawings.
.6 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Amendments and change orders.

.6 Other Documents: Provide construction progress digital photos and videos.

1.7 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURE

.1 Full Depth Asphalt Paving Removal shall be paid by square metre of asphalt removed as per Item 2.02 in the Unit Price Table.

.2 Milling (40mm depth)and disposal off site shall be paid by the square meter of asphalt milled as per item 2.01 in the Unit Price Table.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.2 Removed asphalt shall be taken to a recycling facility.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Use cold milling, planning, cutting, 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 in the Contract Drawings.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed. Sawcut extent of asphalt to be removed. Sawcut and prepare step connection where indicated and as per detailed drawings.

3.2 PROTECTION

.1 Protect existing pavement not designated for removal. Protect lights, bollards, concrete pads, buildings and any other structures designated to remain. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.3 REMOVAL

.1 Remove existing asphalt pavement to lines and grades as indicated in the Contract Drawings.

.2 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.3 Provide for suppression of dust generated by removal process.

3.4 SWEEPING

.1 Sweep step connection surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Selective site demolition shall be paid as follows:

.1 Removal and disposal off site of the existing wooden picket fence shall be paid by linear metre of fence removed, including posts and footings per as per item 1.06 in the Unit Price Table.

.2 Removal and disposal off site of the existing pre-cast concrete retaining wall shall be paid by linear metre of the wall removed, including pre-cast blocks, tie backs, weeping tile, etc., as per item 1.07 in the Unit Price Table.

.3 Removal and disposal off site of the existing gate, including posts and footings shall be paid by unit price as per item 1.08 in the Unit Price Table. Backfill will be paid by unit price as per item 1.08 in the Unit Price Table.

.4 Removal and disposal off site of existing concrete bollards shall be paid by unit price for each bollard removed and replaced as per item 2.19 in the Unit Price Table and shall include removal of any base and/or footing that exists.

.5 Removal and disposal off site of existing maintenance holes shall be paid by unit price for maintenance holes removed as per item 4.03 in the Unit Price Table. Backfilling will be paid under item 2.05. Placement and compaction of suitable sub-base material.

.6 Removal and disposal off site of sanitary sewer will be paid by linear metre of sewer removed as per item 4.01 in the Unit Price Table.

.7 Removal and disposal off site of existing light standards, including fixtures, poles, and concrete footing shall be paid by unit price per pole removed as per item 6.01 in the Unit Price Table. Backfilling shall be paid as per item 2.05 in the Unit Price Table.

.8 Removal and disposal off site of existing fire hydrants, valves, and leads including excavation for, and capping at the main shall be paid by unit price per hydrant removed as per item 5.01 in the Unit Price Table. Backfill will be paid under item 2.05 - placement and compaction of suitable subgrade material.

.9 Relocation of existing Jersey Barriers shall be paid by each one relocated as per item 1.10 in the Unit Price Table.

.10 Removal and Reinstatement of Site Signage, including temporary signage, shall be paid by each sign fully reinstated and shall include all material and equipment to complete the work as per Item 2.05 in the Unit Price Table.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Submit erosion and sedimentation control drawing/plan.

1.3 QUALITY ASSURANCE

.1 Selective demolition work shall be performed by workers familiar with the materials affected. Perform in a manner to neither damage nor endanger any portion of the Work.

1.4 SITE CONDITIONS

.1 Existing conditions:
.1 Take precautions to protect environment. Refer to specification section 01 35 29.
.2 Proceed with work following directions of this specification, all referenced materials and the contract drawings.

.2 Protection:
.1 Prevent movement, or damage of adjacent construction. Provide bracing as required. Repair damage caused by demolition as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Inspect site and verify extent and location of items designated for removal, disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies, as required before starting demolition.

.4 Disconnect, cap, plug or divert, as required, existing utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.5 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.

.6 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PROTECTION

.1 Prevent movement, settlement, or damage to adjacent structures, utilities, landscaping features, and parts of building to remain in place. Provide bracing and shoring required.

.2 Keep noise, dust, and inconvenience to occupants to minimum.

3.3 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways and waterways according to requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

3.4 SELECTIVE DEMOLITION WORK

.1 Remove items for disposal and salvage as indicated on drawings.

.2 Do not damage or deface existing construction, equipment or finishes indicated to remain or items indicated for salvage.

.3 Dispose of rubble, debris, and removed materials off site. Dispose of materials in accordance with authority having jurisdiction.

.4 Refer to section 01 14 00 for further requirements of work.

3.5 CLEANING

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

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

.3 Refer to removals drawings and specifications for items to be salvaged for reuse.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA A23.1-14/A23.2-14, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
.2 CSA O86-14, Engineering Design in Wood (Limit States Design).
.3 CSA O121-08(R2013), Douglas Fir Plywood.
.4 CSA O151-09(R2014), Canadian Softwood Plywood.
.5 CSA O153-13, Poplar Plywood.
.6 CSA O437 Series-93(R2011), Standards for OSB and Waferboard. NOT ON CSA WEB SITE
.7 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
.8 CAN/CSA-S269.3-M92(R2013), Concrete Formwork.
.9 ACI 347-04, Guide to Formwork for Concrete.

1.3 SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework in accordance with Section 01 33 00.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA269.1 for Falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms, etc. as set out in CSA A23.1-14. Formwork design and erection shall in general conform to CSA A23.1-14.

.4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

.5 Each shop drawing submission shall bear stamp and signature of qualified Professional Engineer registered or licensed in Province of Ontario, Canada.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials 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.

.4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Use only new materials for formwork.

.2 Formwork materials:
.1 For concrete without special architectural features, use wood and wood product formwork materials to meet requirements of CAN/CSA A23.1/A23.2.

.3 Form ties:
.1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface. No through ties shall be used in below grade concrete elements and in water/wastewater retaining or excluding structures. Ties shall be leak proof in the above situations.

.4 Form liner:
.1 Plywood: high density overlay Douglas Fir to CSA O121.

.5 Form release agent:
.1 Shall be non-staining, non-grain raising, non toxic, low VOC, and shall be for type of formwork on which it is used.
.2 Shall not contain any non-drying ingredients such as mineral oil.

.6 Form stripping agent: colourless mineral oil, non-toxic, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal.

.7 Falsework materials: to CSA S269.1.

.8 Chamfers: Wood, 45° cut from 25mm x 25mm nominal material or plastic type.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Fabricate and erect falsework in accordance with CSA S269.1.

.3 Do not place shores and mud sills on frozen ground.

.4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.

.6 Align form joints and make watertight. Keep form joints to minimum.

.7 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.8 Construct forms for concrete, and place ties as indicated and/or as directed. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

.9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.10 Clean formwork in accordance with CSA A23.1/A23.2 before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.
.1 7 days for footings and abutments.

.2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction shall be to the removed spacings.

.5 Re-use formwork and falsework subject to requirements of CSA A23.1/A23.2.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 11 00 Formwork

.2 Section 03 15 00 Concrete Accessories

.3 Section 03 30 00 Cast-in-Place Concrete

1.2 QUALITY ASSURANCE

.1 Submit mill test reports to verify that reinforcement supplied to the project conforms to Specification.

.2 Conduct and pay for tests of unidentified reinforcement. Conduct test for each tonne or part of a tonne of reinforcement supplied for the Project or as required by the Consultant.

1.3 REFERENCE STANDARDS

.1 CAN/CSA A23.1-14/A23.2, Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-14, Design of Concrete Structures.

.3 CSA Standard G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.

.4 CSA G30.18-09 (R2014), Billet Steel Bars for Concrete Reinforcement.

.5 RSIC Reinforcing Steel Manual of Standard Practice (2004).

.6 CSA S413-14, Parking Structures.

1.4 SHOP DRAWINGS

.1 Prepare and submit placing drawings and barlists, to a scale of not less than the relevant Architectural or Structural drawings, in accordance with General Conditions and RSIC Reinforcing Steel Manual of Standard Practice.

.2 Digital files of design drawings shall not be used in the preparation of shop drawings.

.3 Placing drawings shall be sufficiently detailed and dimensioned to permit setting of all reinforcement without reference to design drawings.

1.5 UNIT PRICES

.1 Requested as part of the Tender, shall include detailing, listing, materials, bending, placing, and cleaning.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Handle and store reinforcement and accessories to ensure that contamination by bond reducing or foreign matter, and damage to its fabricated form does not occur.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Reinforcing Steel: Billet steel, Grade 400, deformed bars to CSA G30.18, unless indicated otherwise.

.2 Cold-drawn Annealed Steel Wire Ties: to CSA G30.5.

.3 Welded Steel Wire Fabric: to CSA G30.5. Provide in flat sheets only.

.4 Chairs, Bolsters, Bar Supports, Spacers: to CSA A23.1/A23.2. Plastic chairs where concrete surfaces at base of chairs are exposed to view, concrete or plastic for slabs on grade, and steel otherwise.

.5 Fabrication tolerance:
- .1 Sheared length ±25 mm (1 in.)
- .2 Stirrups and ties ±13 mm (½ in.)
- .3 All other bends ±25 mm (1 in.)

2.2 FABRICATION

.1 Fabricate reinforcing steel to CSA A23.1/A23.2.

.2 Bend reinforcement only in a permanent fabricating shop unless approved by Departmental Representative.

.3 Bend only in accordance with Drawings.

.4 Tag or otherwise identify reinforcement to indicate its placement in accordance with shop drawings.

.5 Provide splices only at locations indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Examine formwork to ensure that it has been completed and adequately braced in place before commencing to place reinforcement.

3.2 PLACING

.1 Place reinforcing steel as indicated on reviewed shop drawings, in accordance with CSA A23.1/A23.2 and with RSIC Reinforcing Steel Manual of Standard Practice.

.2 Relocate or rebend bars only with approval of Consultant.

.3 Support reinforcement by positive means which shall provide cover for steel in accordance with CSA A23.1/A23.2 or as otherwise shown on Drawings. Supports at exposed concrete surfaces shall be non-marring, and as approved by Consultant.

.4 Do not cut reinforcement, either before or after concrete is placed, to permit incorporation of other Work.

.5 Tie reinforcement in place. Do not weld bars in place.

.6 Remove and replace reinforcement apparently reduced in section.

.7 Place bars to a tolerance of ± 6 mm (¼ in.) from concrete surfaces.

3.3 ADJUSTMENT AND CLEANING

.1 Adjust reinforcement immediately before concrete is placed to ensure that bars are in correct position and are securely tied to maintain position.

.2 Remove materials from surfaces of reinforcement and accessories that would reduce their bond.

END OF SECTION

PART 1 GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Items under this section related to the construction of cast-in-place concrete pilaster shall be paid for all excavation and disposal off site, placement and compaction of Granular A, forming, re-bar installation, concrete placement, and removal of forms and shall be paid as per item 2.14 in the Unit Price Table.

.2 Items under this section related to the construction of concrete bollards shall be paid for all excavation, forming, and concrete placement, backfill, placement and compaction of Granular A for each bollard installed as per item 2.19 in the Unit Price Table. Bollards to match existing bollard base depth, height exposed above grade (900mm), diameter (275mm), and finished appearance.

.3 Items under this section related to the construction of concrete pole bases shall be paid for all excavation and disposal off site, placement and compaction of Granular A, forming, re-bar installation, concrete placement, and removal of forms and shall be paid as per item 6.06 in the Unit Price Table

1.2 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

1.3 QUALITY ASSURANCE

.1 Order concrete from a concrete company who has currently valid "Certificate of Ready Mixed/Mobile Mix Concrete Production Facilities" as issued by the Ready-Mixed Concrete Association of Ontario (RMCAO).

.2 File duplicate copies of all concrete delivery slips. The following information shall be recorded on slips: supplier, serial number of slip, time, batch number, truck number, project, concrete class, cubic metres in load, and time of first mixing of aggregate, cement and water. Make these available for inspection by Departmental Representative at all times.

.3 Record on a set of drawings:

.1 Time and date of each pour, batch number and related test cylinders.
.2 High and low temperatures during each pour.
.3 Outside air temperature and enclosure temperature during cold weather.
.4 Date of removal of forms in each area.
.5 Record on a set of drawings the founding elevations of all footings and variations of foundation Work from that indicated on drawings.
.6 Keep these records at site until Project is completed and make them available for inspection by Departmental Representative.

1.4 REFERENCE STANDARDS

.1 CAN/CSA-A3000-13, Cementitious Materials Compendium.

.2 CAN/CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.3 ASTM C260/C260M-10a, Air Entraining Admixtures for Concrete.

.4 ASTM C94/C94M-07, Standard Specification for Ready-Mixed Concrete.

.5 ASTM C494/C494M-15a, Chemical Admixtures for Concrete.

.6 CSA A283-06(R2016), Qualification Code for Concrete Testing Laboratories.

.7 ASTM G109-07(2013), Standard Test Method for Determining the Effects of Chemical Admixtures on the Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments.

.8 ASTM G180-13, Standard Test Method for Initial Screening of Corrosion Inhibiting Admixtures for Steel in Concrete.

.9 ASTM C1582/C1582M-11, Standard Specification for Admixtures for Use in Chloride-Induced Corrosion of Reducing Steel in Concrete.

1.5 SUBMITTALS

.1 Inspection Laboratory Reports: Submit inspection laboratory reports specified under Field Quality Control in accordance with Section 01 33 00.

.2 Submit for review proposed concrete mix designs for each class and strength of concrete to be used in the project, including pump mix designs and the name of the concrete supplier to the Departmental Representative and the appointed inspection and testing company.

.3 Submit brand name of admixtures & verification that all admixtures used are compatible with each other in accordance with Section 01 33 00.

.4 Submit detailed pour plan indicating extent of each pour complete with dimensions and location of all construction joints in accordance with Section 01 33 00.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Place concrete in cold and hot weather as specified in CSA A23.1/ A23.2

.2 To ensure that concrete cures without suffering damage, take precautions by protective methods, provision of heat, maintenance of humidity, free circulation of warm moist air at concrete surfaces, and other means made necessary by conditions that arise.

.3 Reduce heat gradually when no longer needed for curing so that temperature drop each day does not exceed 11°C until surrounding air temperature is reached.

.4 Have equipment ready for operation at site for maintenance of heat, humidity, and protection of concrete Work at all times during freezing seasons between October 1 and May 15. Supervise equipment by constant attendance while it is operating.

.5 Temperature readings during curing time for cold weather protection is required:
.1 of outside air and at several points within protective enclosure, both of air and of concrete surfaces, to record highest and lowest temperatures.
.2 at start of working day and again at late afternoon
.3 record date, time and location of each temperature reading, and keep readings for future reference.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Concrete materials in accordance with CSA A23.1/A23.2.

.2 Water: Potable to CSA A23.1/A23.2. Verify that no salts are present which will cause efflorescence.

.3 Cement: Portland cement, Type 10, to CSA-A3001, from same source for entire Project for concrete exposed to view.

.4 Aggregate: Natural sand, gravel, or crushed rock to CSA A23.1/A23.2, shall govern for approval and control of fine and coarse aggregates, and their grading; from the same source for entire Project for concrete exposed to view.

.5 Use coarse aggregate of Group I, 20 mm (¾ in.) to 5 mm (7/32 in.), unless otherwise noted.

.6 Water Reducing Admixture: To meet specified requirements of ASTM C494.

.7 Air Entraining Admixture: To meet specified requirements of ASTM C260.

.8 Non-Shrink Grout.

.9 Skim Coat: 10 MPa concrete.

2.2 CONCRETE MIX DESIGN

.1 Base mix design on CSA A23.1/A23.2, Alternate number 1, to produce concrete of strength indicated on drawings or otherwise specified, and with slump and coarse aggregate to conform to this Specification. Design concrete to suit the class of exposure to Table 2 of CSA A23.1/A23.2 and incorporate air entrainment to Table 4 of CSA A23.1/A23.2 unless otherwise noted on the drawings and the specifications.

.2 Provide Ready-Mixed concrete, except that for miscellaneous use in quantities of less than 0.75 m3 (1 cu. yd.) site-mixed concrete may be used. Ready-Mixed concrete shall meet requirements of ASTM C94 for mixing procedures.

.3 Design a mix that avoids segregation of concrete materials and excessive bleeding and that is uniform in colour and texture where exposed to view.

.4 A maximum of 2% air entrainment shall result from the addition of a plasticizing admixture. Add air entraining admixture to provide 5% to 8% air, as determined by CSA A23.1/A23.2 to exposed exterior concrete such as, but not restricted to manholes, catch basins, walls, paving, steps, curbs, bases and furniture.

.5 Slumps of plain mix design shall be not more than 100 mm (4 in.) unless noted.

.6 Add a water reducing admixture to concrete in accordance with manufacturer's specifications. Use admixture only as a plasticizing agent, and incorporate as a liquid by automatic mechanical dispenser. Take admixtures into account when designing mix, and ensure that they are compatible with each other and with joint compounds.

.7 Add corrosion inhibitor admixture at a rate of 15 litres per cubic meter of concrete to inhibit active corrosion to 5.9 kgs. of chlorides per cubic meter of concrete, in accordance with manufacturer

PART 3 EXECUTION

3.1 EXAMINATION

.1 Ensure that no water is present on foundation beds and skim coats where footings and other concrete Work is to be placed. Place concrete only on frost-free ground. Remove previously frozen bearing surfaces.

.2 Ensure that bearing surfaces are undisturbed and approved by inspection and testing company prior to placing concrete. Where satisfactory bearing at indicated levels is not possible, Departmental Representative will direct further excavation to levels necessary for bearing capacity required. No extra payment will be made for adjustments made necessary because of damage to bearing surfaces caused by weather, traffic, or removal of frozen material, or by presence of adjacent construction or services incorporated in the work.

.3 Ensure that compacted fill has been placed to meet specified requirements and that under-slab services have been installed, inspected, tested and approved.

3.2 PLACING CONCRETE

.1 Place concrete as specified in CSA A23.l/A23.2, under the supervision of a competent foreperson at all times. The foreperson supervising the placement, consolidation, finishing and curing of the concrete shall be certified under an industry-recognized concrete finishing program. Such industry-certified programs include ACI Concrete Flatwork Finisher/Technician Certification Program.

.2 Inform Departmental Representative at least 24 hours before each concrete placing operation.

.3 Do not place concrete when it is raining or likely to rain. If rain begins after concrete is placed, and before it is set, protect with waterproof covers until set.

.4 Complete discharge of ready-mix concrete load within 1½ hours from time water was added to dry material. Reduce time to one hour if materials are heated.

.5 For exposed concrete, take special precautions when placing to prevent segregation of concrete, and to avoid cold joints, honeycombing, and voids. Do not allow internal type vibrators to touch formwork or disturb reinforcing steel.

.6 Concrete shall be placed as close to final point of deposit as possible.

.7 Concrete shall not be allowed to free fall more than 1.5 m (5 ft.). Plastic "elephant trunks" shall be used to limit free fall to 1.5 m (5 ft.).

.8 Concrete shall be placed in vertical lifts no greater than 1.2 m (4 ft.).

.9 Use concrete pumps to place concrete only with Departmental Representative's approval of methods, equipment and mix design.

.10 For architectural concrete, take particular care to prevent formation of surface voids and honeycomb.

.11 Employ a sufficient number of vibrators to ensure complete consolidation of concrete throughout entire volume of each layer of concrete. Provide at least one extra vibrator on hand for emergency use. Vibrators shall be in accordance with CSA A23.1/A23.2, Table 19.

.12 After completing concrete in walls or columns, allow at least two hours before placing slabs and beams supported there on, unless otherwise approved.

3.3 CONSTRUCTION JOINTS

.1 Locate and install construction joints as approved by Departmental Representative, in accordance with CSA A23.l/A23.2. Reinforcement shall be continuous through joint.

.2 Immediately before next pour, thoroughly clean joint of all laitance and foreign material.

.3 Joints in slabs on grade shall be made using an approved joint form.

3.4 CURING

.1 Cure concrete as specified in CSA A23.1/A23.2.

.2 Ensure that freshly placed concrete is protected from mechanical shock and contact with injurious substances.

.3 Do not use curing compounds that would have a detrimental effect on bonding, adhesion, curing, appearance, or similar qualities of materials applied to concrete surfaces. Only moisture cure surfaces where finishes are incompatible with curing compound.

3.5 MASS CONCRETE

.1 Mass concrete shall be water cured for 3 days when the temperature is at or above 20ºC, in order to minimize the temperature rise of the concrete. Extend the curing period for an additional four consecutive days and for the time necessary to attain 100% of the specified compressive strength of the concrete.

.2 Concrete mix to be designed to limit the internal and external concrete temperature differential.

.3 The temperature of the concrete as placed shall be as low as practicable and in no case greater than that stipulated in Table 14 of CSA A23.1/A23.2.

.4 The concrete and ambient temperature should be monitored to determine whether the 20°C temperature differential is being met and to check compliance with the requirements of Table 21 of CSA A23.1/A23.2. Additional protection shall be provided to limit the internal and external concrete temperature differential to within 20°C.

3.6 FIELD QUALITY CONTROL

.1 An independent inspection and testing company will carry out inspection and testing in accordance with General Conditions, CSA A23.1/A23.2 and CSA Standard A283.

.2 Co-operate with the inspector and afford all facilities necessary to permit full inspection of the work and testing of materials prior to their use. Act immediately on instructions given by the inspector.

.3 Provide facilities for testing and storing of cylinders on site. Store cylinders at required temperature and where they will be free from vibration and injury. Deliver cylinders as directed with properly noted Ready-Mixed Concrete Association of Ontario tags attached.

.4 Notify inspection and testing laboratory of schedule for work in ample time so that specified samples may be obtained.

.5 Take three control cylinders from each pour and from each class of concrete, and in no case shall there be fewer than three from each 100m^3 thereof. Make, handle and store cylinders in accordance with CSA A23.1/A23.2. The inspection laboratory shall take the actual concrete samples at point of discharge into forms. When concrete is being placed at ambient temperatures of 4.5°C or less, one additional 7 day cylinder will be required, and cured in accordance with CSA A23.1/A23.2 at site adjacent to where it was is charged.

.6 Make strength test of one cylinder from each sampling at 7 days and of other two cylinders from same sampling at 28 days. Make strength test at 7 days of additional cylinder from each sampling taken during cold weather placing.

.7 Make air entraining test in accordance with CSA A23.1/A23.2 for each pour that is specified to contain an air entraining agent.

.8 Make slump tests on each batch tested in accordance with CSA A23.1/A23.2.

.9 Immediately after testing, submit a copy of report for each test directly to Departmental Representative. Include in reports location of concrete in construction, all conditions affecting pour, all results and a statement as to whether or not materials comply with this Specification. Submit concrete cylinder test reports on current issue of Standard Report Form as published by Ready-Mixed Concrete Association of Ontario.

.10 Payment for re-testing and re-inspection of work replacing that found defective following initial inspection made under Contract Work, or as otherwise made evident, is the responsibility of the Sub-contractor and will not be considered as additional work of the contract.

3.7 ADJUSTMENT AND CLEANING

.1 Immediately cease further concrete placing on advice that concrete already in place has been disapproved by Departmental Representative or testing personnel, or that it has failed tests to which it was subjected.

.2 Perform further testing, obtain core samples, survey work in place, obtain structural analysis and conduct load tests of structure in place and other work as directed by the Departmental Representative and at no expense to the owner.

.3 Determine if work is acceptable.

.4 Work located out of place, exceeding specified tolerances, improperly placed, exhibiting excessive honeycombing, or not otherwise meeting specified requirements shall be rejected.

.5 Do not permit disapproved or rejected materials on the site.

.6 Replace disapproved and rejected work to meet requirements of structural design intent and qualities described in this specification in a manner approved by Departmental Representative. Replacement of work shall include reinforcement of structure if proposed and approved by Departmental Representative.

.7 Remove from the site excess and waste materials, and debris resulting from work of this Contract.

3.8 CONCRETE FINISH SCHEDULE

.1 Formed Concrete Surfaces: Treat formed surfaces as specified in CSA A23.1/A23.2 and in addition:
.1 Provide sample areas of finished surfaces for Departmental Representative's approval. Correct surfaces by regrinding or as otherwise necessary to meet Departmental Representative's approval.
.2 Plugs at Recessed Ties:
.3 Clean tie holes to remove foreign materials.
.4 Insert plugs in tie holes with a rotating motion and tap in place with a rubber or wood mallet in accordance with manufacturer's directions.
.5 Plugs are supplied under Work of Section 03 l0 00.

.2 Formed Concrete Finishes and Designations are:
.1 Concrete Finish C-l: Structural concrete not exposed to view. As cast.
.2 Concrete Finish C-2: Structural concrete in finished areas that are exposed to view. Bring surfaces to a smooth mortar finish as approved by Architect from completed sample where no finish is applied, and otherwise as suitable for finish coatings, by use of only sand, water, and carborundum block. Produce a surface which is perfectly straight; smooth; consistent colour and texture; and free from marks, roughness, projecting lines, and other defects. Wash down surfaces with clean water and fibre brushes. Finish suitable for coating or paint where noted.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Construction of wooden fencing shall be paid by linear metre of fence installed, including posts, footings, and painting as per item 2.15 in the Unit Price Table.

1.2 REFERENCES

.1 ASTM International
.1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 CSA International
.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
.2 CSA O141-05(R2014), Softwood Lumber.

.3 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2014.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

1.4 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.
.3 CAN/CSA-Z809 or FSC or SFI certified.

2.2 ACCESSORIES

.1 Nails, spikes and staples: to CSA B111.

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

2.3 FINISHES

.1 Galvanizing: to ASTM A653/A653M, use galvanized fasteners for exterior work.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Comply with requirements of NBC.

3.2 ERECTION

.1 Construct picket fencing to match existing using similar member sizes and fastening details.

.2 Post spacing to match existing. Provide 250mm Ø concrete piers to minimum 1.5m depth for post support. Embed wood in concrete to 75mm from base of pier.

.3 Prime and paint finish. Colour to be verified by Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT

.1 Unless otherwise directed, all the general requirements specified herein shall not be subject to measurement and payment but shall be allowed for in the Contract Price.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
- .2 CAN/CSA-C22.3 No. 1-15, Overhead Systems.
- .3 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .4 Do underground systems in accordance with CSA C22.3 No.7-15, Underground Systems, except where specified otherwise.

.2 National Electrical Manufacturer's Association (NEMA)

.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.

.6 CSC Technical Criteria
- .1 ES/STD0101 Revision 3
- .2 ES/STD0102 Revision 2
- .3 ES/STD0203 Revision 2
- .4 ES/STD0204 Revision 1
- .5 ES/STD0205 Revision 1
- .6 ES/STD0207 Revision 1
- .7 ES/STD0208 Revision 1
- .8 ES/STD0209 Revision 1
- .9 ES/STD0213 Revision 1
- .10 ES/STD0214 Revision 1
- .11 ES/STD0215 Revision 1
- .12 ES/STD0218 Revision 0
- .13 ES/STD0219 Revision 0
- .14 ES/STD0220 Revision 2
- .15 ES/STD0221 Revision 0
- .16 ES/STD0222 Revision 0
- .17 ES/STD0223 Revision 1
- .18 ES/STD0227 Revision 0
- .19 ES/STD0228 Revision 0
- .20 ES/STD0229 Revision 2

.21 ES/STD0230 Revision 0
.22 ES/STD0231 Revision 0
.23 ES/STD0232 Revision 0
.24 ES/STD0234 Revision 0
.25 ES/STD0601 Revision 3
.26 ES/STD0602 Revision 3
.27 ES/STD0801 Revision 1
.28 ES/STD0802 Revision 1
.29 ES/STD0803 Revision 2
.30 ES/STD0804 Revision 2
.31 ES/STD0805 Original
.32 ES/SOW-0101 Revision 3
.33 ES/SOW-0102 Revision 6
.34 ES/SOW-0110 Revision 1
.35 ES/SPEC-0005 Revision 5
.36 ES/SPEC-0006 Revision 2
.37 ES/SPEC-0101 Revision 2
.38 ES/SPEC-0102 Revision 2
.39 ES/SPEC-0103 Revision 2
.40 ES/SPEC-0200 Revision 3
.41 ES/SPEC-0006 Revision 2
.42 ES/SPEC-0500 Revision 4
.43 ES/SPEC-0600 Revision 2
.44 ES/SPEC-0602 Revision 3
.45 ES/SPEC-0603 Revision 2
.46 ES/SPEC-0800 Revision 2
.47 ES/SPEC-0900 Revision 2

1.3 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, 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.

1.4 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00.

.2 Product Data: submit WHMIS MSDS.

.3 Shop drawings:
.1 Submit drawings stamped and signed by Contractor.
.2 Submit 3 copies of 600 x 600 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 or authority having jurisdiction upon completion of Work to Departmental Representative.

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.
.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 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 SUSTAINABLE REQUIREMENTS

.1 Materials and products.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00.

.2 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.

.3 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of inspection authorities and Departmental Representative.

.2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

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

2.5 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:
.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, black face, white core and lettering accurately aligned and engraved into core mechanically attached with self tapping screws for normal power.

.2 Wording 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 Terminal cabinets and pull boxes: indicate system and voltage.

2.6 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.

2.7 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code by prepainting couplings, connectors and boxes.

.3 Colours:

Service	Colour
up to 600 V	brown

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 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.

3.4 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.5 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 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
.3 Provide upon completion of work, load balance report as directed in PART 1 - Submittals: phase and neutral currents on panelboards, dry-core transformers and motor control centres, 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 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.
.3 Lighting and its control.
.4 Insulation resistance testing:
.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
.3 Check resistance to ground before energizing.

.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.

.5 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.6 Verification requirements:
.1 Materials and resources.
.2 Storage and collection of recyclables.
.3 Construction waste management.
.4 Resource reuse.
.5 Recycled content.
.6 Local/regional materials.
.7 Certified wood.
.8 Low-emitting materials.

3.6 CLEANING

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

.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.

3.7 POWER SHUTDOWN

.1 Power shutdown shall be kept to a minimum. Schedule shutdowns well in advance with Departmental 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 LAN services, ie. security, fire alarm, telephone, lan, normal and essential power, etc. remain operational during construction.

3.8 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.

3.9 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into operation and maintenance manuals specified in Section 01 78 00.

.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.

3.10 TRIAL USAGE

.1 Power supply, distribution system and equipment may be put into service for trial usage provided such use will not damage equipment or void guarantees.

.2 Departmental Representative may use equipment and systems for test purposes prior to acceptance.

.3 Provide labour and equipment required for testing.

3.11 AS-BUILT RECORDS

.1 As work progresses, maintain accurate records to show deviations from contract drawings. The Departmental 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.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for wire and box connectors.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section shall be paid by unit rate as per Items 6.02, 6.03, 6.04, 6.05 in the Unit Rate Table. Each of the noted unit rates is to include within the unit rate costs for any associated wire and box connectors as indicated in the specification section.

1.3 REFERENCES

.1 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
.1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.2 National Electrical Manufacturers Association (NEMA).

.3 Canadian Standards Association (CSA International)
.1 CSA C22.2 No. 65-13, Wire Connectors.
.2 CSA C22.2 No. 18.3-12, Conduit, Tubing and Cable Fittings.

1.4 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit in accordance with Section 01 78 00.

.3 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 All fixtures and Branch Circuit wiring joints, in junction and outlet boxes shall be made with CSA Certified Pressure Type connectors rated at 600 volts maximum (1,000 volts when enclosed in fixture or sign). Connector body shall consist of a cone-shaped coil spring insert, insulated with a colour-coded, flame-retardant shell which shall be knurled for easy grip and capable for use with an Electrician's Pliers.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to NEMA to consist of:
.1 Connector body and stud clamp for stranded copper conductor.
.2 Clamp for stranded copper conductors.
.3 Stud clamp bolts.
.4 Bolts for copper conductors.
.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, TECK cable mineral insulated cable and flexible conduit as required to: CAN/CSA-C22.2 No.18.

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 wire and box connectors 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 Remove insulation carefully from ends of conductors and:
.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
.2 Install fixture type connectors and tighten. Replace insulating cap.
.3 Install bushing stud connectors in accordance with NEMA.

3.3 CLEANING

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

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTION

.1 26 05 00 - Common Work Results - For Electrical.

1.2 REFERENCES

.1 CSA C22.2 No. 0.3-09 (R2014), Test Methods for Electrical Wires and Cables.

.2 CSA C22.2 No. 131-14, Type TECK 90 Cable.

1.3 MEASUREMENT PROCEDURES

.1 Include provisions (supply and install) of all indicated wiring and cables. Items under this Section shall be paid in linear metres as per item 6.08 in the Unit Price Table.

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 in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 Volt insulation for 250 Volts or less or 1000 V insulation for 600 Volts or less 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.

.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.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20.

.2 Cable Colour Coding: to Section 26 05 00.

.3 Conductor length for parallel feeders to be identical.

.4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.5 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

.1 Install wiring as follows:
.1 In conduit systems in accordance with Section 26 05 34.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - For Electrical.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section shall be paid by unit rate of various light standards as per Items 6.02, 6.03, 6.04, and 6.06 in the Unit Price Table. Bonding Conductor to be paid as per item 6.08 in the Unit Price Table. Each of the noted unit rates is to include within the unit rate costs for any associated grounding - secondary wiring/work as indicated in this specification section.

1.3 REFERENCES

.1 Canadian Standards Association, (CSA International)
.1 CAN/CSA-Z32-09, Electrical Safety and Essential Electrical Systems in Health Care Facilities.
.2 CSA C22.2 No. 41-13, Grounding and Bonding Equipment.

.2 Institute of Electrical and Electronics Engineers (IEEE)
.1 IEEE 837-2014, Standard for Qualifying Permanent Connections used in Substation Grounding.

.3 Grounding equipment based on CSA C22.2 No. 41-07.

1.4 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.7 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect grounding equipment from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.

.2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, soft annealed, size as indicated.

.3 Rod electrodes: copper clad steel 19 mm dia by 3 m long.

.4 Plate electrodes: copper, surface area 0.2 m^2, 1.6 mm thick.

.5 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.6 Insulated grounding conductors: green, type RW90.

.7 Ground bus: copper, size as required or indicated, complete with insulated supports, fastenings, connectors.

.8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
.1 Grounding and bonding bushings.
.2 Protective type clamps.
.3 Bolted type conductor connectors.
.4 Thermit welded type conductor connectors.
.5 Bonding jumpers, straps.
.6 Pressure wire connectors.

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 grounding equipment 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 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 conductive water main, electrodes, using copper welding by thermit process permanent mechanical connectors 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 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.

.11 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end and load end.

3.3 MAINTENANCE HOLES

.1 Install conveniently located grounding stud, electrode, size #6 stranded copper conductor in each maintenance hole.

.2 Install ground rod in each maintenance hole so that top projects through bottom of maintenance hole. Provide with lug to which grounding connection can be made.

.3 Confirm ground resistance meets or exceeds Canadian Electrical Code minimum requirements.

3.4 ELECTRODES

.1 Make ground connections to continuously conductive underground water pipe on street side of water meter.

.2 Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.

.3 Install rod, electrodes and make grounding connections.

.4 Bond separate, multiple electrodes together.

.5 Use size 3/0 AWG copper conductors for connections to electrodes.

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

3.5 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list: distribution panels, outdoor lighting.

3.6 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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 26 05 00 - Common Work Results - for Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.3 MEASUREMENT PROCEDURES

.1 Items under this Section shall include provision (supply and install) of 457mm x 609mm lighting pull box to be paid as per Item 6.09 in the Unit Price Table.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00.
.1 Provide drawings stamped and signed by Contractor.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 JUNCTION AND PULL BOXES

.1 Construction: 457x609mm polymer concrete.

.2 Covers Flush Mounted: one lift pin and four bolt down locations.

.3 Recessed nameplate reading "Parking Lot Lighting."

PART 3 - EXECUTION

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Only main junction and pull boxes are indicated. Install additional pull boxes so as not to exceed 30 m of conduit run between pull boxes.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00.

.2 Identification Labels: size 2 indicating system name voltage and phase.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section shall be paid as per Item 6.07 in the Unit Price Table. The noted unit rate is to include within the unit rate costs for any associated outlet boxes, conduit boxes, and fittings as indicated in this specification section.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit samples for floor box in accordance with Section 01 33 00.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 00.

PART 2 - PRODUCTS

2.1 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.4 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA-C22.2 NO. 18.1-13, Metallic Outlet Boxes.
.2 CAN/CSA-C22.2 NO. 18.2-06 (R2011), Nonmetallic Outlet Boxes.
.3 CAN/CSA-C22.2 No. 18.3-12, Conduit, Tubing and Cable Fittings (Tri-National standard, with ANCE NMX-J-017 and UL 514B).
.4 CSA C22.2 No. 45.1-07 (R2012), Electrical Rigid Metal Conduit - Steel (Tri-National standard, with UL 6 and NMX-J-534-ANCE-2007.
.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 (R2011), Rigid PVC (Unplasticized) Conduit.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section shall be paid by linear metre and shall include all excavation, supply and placement of conduit, marking tape, sand and backfill, and concrete topping as per Item 6.07 in the Unit Rate Table.

1.3 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.

1.4 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.

PART 2 - PRODUCTS

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with expanded ends.

.3 Rigid PVC conduit: to CSA C22.2 No. 211.2.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits NPS 2 50 mm and smaller.
.1 Two hole steel straps for conduits larger than NPS 2 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.2 m on centre.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: to CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Watertight connectors and couplings for EMT.
.1 Set-screws are not acceptable.

2.4 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 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas such as attics.

.3 Use rigid hot dipped galvanized steel threaded conduit for surface mounting in inmate areas.

.4 Use electrical metallic tubing (EMT) in electrical rooms, mechanical rooms, areas not accessible to inmates and inaccessible ceilings.

.5 Use rigid pvc conduit underground.

.6 Minimum conduit size for lighting and power circuits: NPS 3/4 21 mm.

.7 Bend conduit cold:
.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 21 mm diameter.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install fish cord in empty conduits.

.11 Remove and replace blocked conduit sections.
.1 Do not use liquids to clean out conduits.

.12 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel.
.1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.
.1 Use cold mastic between sleeve and conduit.

.5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 27 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits NPS 1 27 mm and larger below slab and encase in 75 mm concrete envelope.
.1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Items under this Section shall be paid by unit rates as per Items 6.08 in the Unit Rate Table. The noted unit rates is to include within the unit rate costs for any associated installation of cable in ducts in trenches as indicated in the specification section.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Division 01 Submittal Procedure requirements.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for cables and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Division 01 Requirements.

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

.3 Storage and Handling Requirements:
.1 Store materials and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect cables from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MARKERS

.1 Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs.

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 cable 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 and/or Consultant.

3.2 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.

3.3 MARKERS

.1 Mark cable every 150 m along duct runs and changes in direction.

.2 Mark underground splices.

.3 Where markers are removed to permit installation of additional cables, reinstall existing markers.

3.4 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using qualified personnel.
.1 Include 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.
.1 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 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.
.2 Ground shields, ground wires, metallic armour and conductors not under test.
.3 High Potential (Hipot) Testing.
.4 Conduct hipot testing in accordance with cable manufacturer's recommendations.

.7 Provide Departmental Representative and Consultant 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.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 requirements.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 requirements

.3 Waste Management: separate waste materials for recycling in accordance with Division 01 requirements.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

.1 Repair damage to adjacent materials caused by cables installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)
.1 ANSI C82.1-2004 (R2015), Line Frequency Fluorescent Lamp Ballasts.
.2 ANSI C82.4-2002, Ballasts for High-Intensity Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
.1 ANSI/IEEE C62.41-1991, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.3 ASTM International Inc.
.1 ASTM F1137-11e1, Stand1ard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 Canadian Standards Association (CSA International)

.5 ICES-005-07, Radio Frequency Lighting Devices.

.6 Underwriters' Laboratories of Canada (ULC).

1.2 MEASUREMENT PROCEDURES

.1 Items under this section shall be paid as per Item 6.02, 6.03, 6.04, and 6.05 in the Unit Price Table. Provision (supply and install) all indicated light standards and light fixture heads as indicated in the Unit Rate Table and the contract drawings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Departmental Representative.
.3 Photometric data to include:
.1 Total input watts.
.2 Candela.
.3 Distribution zonal lumen summary.

.4 Luminaire efficiency.
.5 Coefficient of utilization.
.6 LED type.

.3 Quality assurance submittals: provide following in accordance with Section 01 45 00.
.1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials in accordance with Section 01 74 20.

.4 Divert unused metal materials from landfill to metal recycling facility.

.5 Disposal and recycling of fluorescent lamps as per local regulations.

.6 Disposal of old PCB filled ballasts.

PART 2 - PRODUCTS

2.1 FINISHES

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

2.2 LUMINAIRES

.1 Type A
.1 9.1m steel pole c/w barrier, tapered from 102mm to 178mm octogonal, 12ga. wall thickness, welded to the anchor plate. Pole Style and colour to match existing.

.2 Type B
.1 LED area light fixture. Single head 533mm housing on 229mm straight arm. Type 3 distribution, 130LA, 5700K colour temperature, and 70 CRI. 347v driver. Bronze finish c/w square pole adapter.

.3 Type B1
.1 LED area light fixture. Two heads at 90 degrees. 533mm housing on 229mm straight arm. Type 3 distribution, 55LA, 5700K colour temperature, and 70 CRI. 347v driver. Bronze finish c/w square pole adapter.

.4 Type B2
.1 LED area light fixture. Four heads at 90 degrees. 533mm housing on 229mm straight arm. Type 3 distribution, 55LA, 5700K colour temperature, and 70 CRI. 347v driver. Bronze finish c/w square pole adapter.

2.3 WARRANTY

.1 Provide 10 year certificate of warranty on Luminaires.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Locate and install poles / luminaires as indicated.

.2 Provide adequate base to support pole with head.

.3 Replace faulty LED boards.

3.2 WIRING

.1 Connect luminaires to lighting circuits:
.1 Install PVC conduit as indicated.

3.3 LUMINAIRE ALIGNMENT

.1 Maintain continuous offset from curbs.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Stone required for the infiltration swale shall be paid by linear metre of swale installed under item 3.06 of the Unit Rate Table.

.2 Rip Rap for culvert installation shall be included in item 3.02 of the Unit Rate Table.

.3 Sand for new electrical conduit trenches shall be included in item 6.07 of the Unit Rate Table.

1.2 REFERENCES

.1 Ontario Provincial Standard Specification (OPSS)
.1 OPSS.PROV 1010 November 2013, Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
.2 OPSS.PROV 1004 November 2012, Aggregates Miscellaneous.

1.3 SAMPLES

.1 Allow continual sampling by Departmental Representative during production.

.2 Provide Departmental Representative with access to source and processed material for sampling.

.3 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 19mm clear stone to OPSS.PROV 1004.

.2 Rip Rap to OPSS.PROV 1004.

.3 Sand to OPSS.PROV 1010.

2.2 SOURCE QUALITY CONTROL

.1 If, in opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.2 Advise Departmental Representative 4 weeks in advance of proposed change of material source.

.3 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 33 - Excavating, Trenching, and Backfilling.

1.2 MEASUREMENT

.1 Items under this Section related to the regrading of the existing ditch and new swale shall be paid by linear metre and shall include all grading and compaction to width required to achieve positive drainage as per item 3.01 and 3.06 in the Unit Rate Table.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D698-12e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3).

1.4 EXISTING CONDITIONS

.1 Known underground and surface utility lines and buried objects are as indicated on site plan.

1.5 PROTECTION

.1 Protect and/or transplant existing fences, trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain and as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fill material: In accordance with Section 31 23 33.

PART 3 - EXECUTION

3.1 STRIPPING OF TOPSOIL

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

.2 Commence topsoil stripping of areas as indicated in the Contract Drawings or as required for Performance of Work after area has been cleared of brush weeds and grasses and removed from site.

.3 Strip topsoil to depths as indicated in the Contract Drawings. Rototill weeds and grasses and retain as topsoil on site. Avoid mixing topsoil with subsoil.

.4 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2.0 m.

.5 Dispose of unused topsoil off site.

3.2 GRADING

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Rough grade to following depths below finish grades:
- .1 100 mm for grassed areas.
- .2 As per contract drawings.

.3 Grade swales and ditches to depth as indicated in the Contract Drawings.

.4 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.5 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:
- .1 85% under landscaped areas.
- .2 95% under paved and walk areas.

.6 Do not disturb soil within branch spread of trees or shrubs to remain.

3.3 TESTING

.1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by Departmental Representative. Costs of tests will be paid by Owner. Refer to Section 01 45 00.

3.4 SURPLUS MATERIAL

.1 Remove surplus material and material unsuitable for fill, grading or landscaping off site or as directed by Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Items under this section related to rock removal shall be paid by unit rate per cubic metre of rock removed and disposed of off-site as per item 1.04 in the Unit Rate Table.

1.2 REFERENCES

.1 Definitions:

.1 Rock: any solid material in excess of 0.25 cubic metre and which cannot be removed by means of heavy duty mechanical excavating equipment. Frozen material not classified as rock.

1.3 DELIVERY, STORAGE AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Not used.

PART 3 - EXECUTION

3.1 ROCK REMOVAL

.1 Perform excavation in accordance with Erosion and Sedimentation Control Plan.

.2 Co-ordinate this Section with Section 01 35 29.

.3 Remove rock to alignments, profiles, and cross sections as indicated.

.4 Explosive blasting is not permitted.

.5 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.6 Excavate rock to horizontal surfaces with slope not to exceed 5%.

.7 Remove boulders and fragments which may slide or roll into excavated areas.

.8 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.

3.2 CLEANING

.1 Clean in accordance with Section 01 74 11.

.2 Rock Disposal:
.1 Dispose of surplus removed rock in on-site location identified by Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 02 41 99 - Demolition.

.2 Section 31 22 13 - Granular Base.

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/C136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63(2014), Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ^{3}) (600 kN-m/m ^{3}).

.5 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CAN/CSA A3001-13, Cementitious Materials for Use in Concrete.

.2 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.3 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation

.1 OPSS.PROV 1004, November 2012, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.

.2 OPSS.PROV 1010, November 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

1.3 MEASUREMENT PROCEDURES

.1 Items under this Section will be paid as per the Unit Rate Table as applicable and as identified in other related sections:

.1 General Oversite Earth Excavation shall be paid by cubic metre of material excavated and disposed of off-site as per item 2.03 in the Unit Rate Table.

.2 Subexcavation of unsuitable material below the top of the sub-grade design elevations shall be paid by cubic metre of material excavated and disposed of off-site. This is a provisional item based on existing site conditions as identified by the Departmental Representative and shall be paid under item 2.04 in the Unit Rate Table.

.3 Areas where unsuitable material has been removed shall be backfilled and compacted with approved backfill material and shall be paid by cubic metre of material placed and compacted as per item 2.05 in the Unit Price Table. Please note, this is a provisional item based on need as determined by the Departmental Representative.

.4 Excavating, trenching, and backfilling for installation of structurers and services will be paid under the representative items in the Unit Rate Table.

.5 Preparation and compaction of the subgrade prior to placement of the Granular B sub-base shall be paid by square metre and shall include all grading, preparation, and compaction to sub-grade elevations as per item 1.09 in the Unit Price Table.

1.4 DEFINITIONS

.1 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.2 Topsoil:

.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 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.6 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, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
.2 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

.7 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.

1.5 SUBMITTALS

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

.2 Quality Control: in accordance with Section 01 45 00:
.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
.2 Submit for review by Departmental Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.
.3 Submit to Departmental Representative written notice when bottom of excavation is reached.
.4 Submit to Departmental Representative testing inspection results and report as described in Section 01 45 00.

.3 Preconstruction Submittals:
.1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
.2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in fields.

.4 Samples:
.1 Submit samples in accordance with Section 01 33 00.

.2 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of fill materials.

1.6 QUALITY ASSURANCE

.1 Where Engineer is employee of Contractor, submit proof that Work by the Engineer is included in Contractor's insurance coverage.

.2 Submit design and supporting data at least 2 weeks prior to beginning Work.

.3 Design and supporting data submitted to bear stamp and signature of qualified professional Engineer registered or licensed in Province of Ontario, Canada.

.4 Keep design and supporting data on site.

.5 Engage services of qualified Professional Engineer who is registered or licensed in Province of Ontario, Canada in which Work is to be carried out to design and inspect shoring, bracing and underpinning required for Work.

.6 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.

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

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.8 EXISTING CONDITIONS

.1 Examine geotechnical report appended to this specification in Annex A.

.2 Buried services:
.1 Before commencing work verify and establish location of buried services on and adjacent to site.
.2 Coordinate with appropriate authority for relocation of buried services.
.3 Remove obsolete buried services as indicated in the Contract Drawings.

.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
.5 Confirm locations of buried utilities by careful test excavations and soil hydrovac methods as appropriate.
.6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered and as indicated on the Contract Drawings.
.7 Record location of maintained, re-routed and abandoned underground lines.
.8 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing buildings and surface features:
.1 Conduct, with Departmental 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 Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Approved Trench Backfill: selected material from trench excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse, other deleterious materials.

.2 Granular material: to OPSS.PROV 1010 for:
.1 Granular A, maximum size 19.0 mm.
.2 Granular B, Type I, maximum size 26.5 mm.

.3 Sand: clean, washed, minimum 100% passing 4.75 mm sieve, maximum 5% passing 0.075 mm sieve to OPSS.PROV 1004.05.04.

.4 Drainage material: 19 mm crushed stone or 19 to 63 mm clean gravel to OPSS.PROV 1004.05.07.

.5 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 ^{3} with 40% by volume fly ash replacement: to CAN/CSA-A3001, Type GU.
.3 Minimum strength of 0.07 MPa at 24 h.
.4 Concrete aggregates: to CAN/CSA-A23.1/A23.2.
.5 Cement: Type GU.
.6 Slump: 160 to 200 mm.

PART 3 - EXECUTION

3.1 SITE PREPARATION

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

.2 Cut pavement and sidewalks neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 PREPARATION/ PROTECTION

.1 Protect existing features in accordance with Section 01 56 00 and applicable local regulations.

.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 Departmental Representative 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.

3.3 STRIPPING OF TOPSOIL

.1 In accordance with Section 31 22 13.

3.4 STOCKPILING

.1 Stripped topsoil shall be stockpiled on-site for re-use at a location approved by CSC.

.2 Excluding stripped topsoil and material used in trenching backfill, no excavated material shall be stockpiled on the site. All excavated material shall be removed and disposed of off-site.

3.5 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for Departmental Representative's review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in accordance with Section 01 35 43 to approved collection runoff areas and 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.

3.6 EXCAVATION

.1 Advise Departmental Representative at least 7 days in advance of excavation operations.

.2 Excavate to lines, grades, elevations and dimensions as indicated.

.3 Remove concrete, masonry, paving, walks, demolished foundations and rubble, and other obstructions encountered during excavation in accordance with Section 02 41 99.

.4 Excavation must not interfere with bearing capacity of adjacent foundations.

.5 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open at end of day's operation.

.6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material off site.

.9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.10 Notify Departmental Representative when bottom of excavation is reached.

.11 Obtain Departmental Representative approval of completed excavation.

.12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.13 Correct unauthorized over-excavation as follows:
.1 Fill under bearing surfaces and footings with unshrinkable fill.
.2 Fill under other areas with Granular B, Type 1 fill compacted to not less than 95% of corrected Standard Proctor Maximum Dry Density.

.14 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.
.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated in the Contract Drawings.

.2 Place bedding and surround material in unfrozen condition.

3.8 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.
.2 Departmental 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.
.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.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 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer to not less than 95% of corrected standard proctor maximum dry density.

.5 Backfilling around installations:
.1 Place bedding and surround material as specified elsewhere.
.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.2 m.
.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative or:
.2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

.6 Place unshrinkable fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

.8 Install drainage filter system in backfill as indicated in the Contract Drawings.

3.9 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 Departmental Representative.

.2 Replace topsoil as specified and as indicated in the Contract Drawings.

.3 Reinstate lawns to elevation which existed before excavation or as indicated in the Contract Drawings.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation or as indicated in the Contract Drawings.

.5 Clean and reinstate areas affected by Work as specified or directed by Departmental Representative.

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS.PROV 1010, November 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Materials

.2 American Society for Testing and Materials International (ASTM)
.1 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section will be paid by tonne of material supplied, placed, compacted, and graded as per item 2.07 in the Unit Rate Table.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular A to OPSS.PROV 1010.

PART 3 - EXECUTION

3.1 PLACING

.1 Place on a clean surface, properly shaped and compacted and free from snow or ice.

.2 Place material in layers not exceeding 150 mm when compacted.

.3 Spread each layer uniformly using approved grading equipment and methods to depths ad grades indicated in the Contract Drawings.

3.2 COMPACTING

.1 Compact each layer to minimum 100% Standard Proctor Maximum Dry Density.

.2 Add water as required to maintain material at or near optimum moisture content while compacting.

3.3 FINISHING

.1 Finish compacted surface to within 12 mm of established grade as indicated by a 3 m straightedge placed in any direction

.2 Correct irregularities greater than 12 mm by loosening the surface and adding or removing material until surface is within specified tolerance.

3.4 FIELD QUALITY CONTROL

.1 The Departmental Representative will perform field and laboratory tests for control of moisture, density and aggregate gradation. Results will control Contractor's operations.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS.PROV 1010, November 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Materials

.2 American Society for Testing and Materials International (ASTM)
.1 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section will be paid by tonne of material supplied, placed, compacted, and graded as per item 2.06 in the Unit Rate Table.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular B Type I: to OPSS.PROV 1010. Maximum size Granular B Type I, 75.0 mm.

PART 3 - EXECUTION

3.1 PLACING

.1 Place on a clean surface, properly shaped and compacted and free from snow or ice.

.2 Place material in layers not exceeding 225 mm when compacted.

.3 Spread each layer uniformly using approved grading equipment and methods.

3.2 COMPACTING

.1 Compact each layer to minimum 100% Standard Proctor Maximum Dry Density.

.2 Add water as required to maintain material at or near optimum moisture content while compacting.

3.3 FINISHING

.1 Finish compacted surface to within 12 mm of established grade as indicated by a 3 m straightedge placed in any direction.

.2 Correct irregularities greater than 12 mm by loosening the surface and adding or removing material until surface is within specified tolerance.

3.4 FIELD QUALITY CONTROL

.1 The Departmental Representative will perform field and laboratory tests for control of moisture, density and aggregate gradation. Results will control Contractor's operations.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Payment at the Contract price for the above tender item shall be full compensation for all labour, equipment, and material to do the work and shall be paid by square metre of tack coat applied as per item 2.09 and 2.10 in the Unit Price Table.

1.2 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)
.1 AASHTO M081-92-UL-04, Standard Specification for Cutback Asphalt (Rapid-Curing Type).

.2 ASTM International (ASTM)
.1 ASTM D140/D140M-14, Standard Practice for Sampling Bituminous Materials.
.2 ASTM D633-11, Standard Volume Correction Table for Road Tar.
.3 ASTM D1250-08(2013), Standard Guide for Use of the Petroleum Measurement Tables.

.3 Canada Green Building Council (CaGBC)
.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum 2007).
.2 LEED Canada-NC-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.
.3 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
.4 LEED Canada-EB: O&M-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

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 asphalt tack coat and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect asphalt tack coats from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Deliver, store and handle materials in accordance with ASTM D140/D140M.

.5 Provide, maintain and restore asphalt storage area.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20, and with the Waste Reduction Workplan.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: SS-1 SS-1h.

.2 Cut-back asphalt; to AASHTO M081-92-UL, grade RC-70 or RC-250.

.3 Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

.1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.

.2 Pressure distributor:
.1 Designed, equipped, maintained and operated so that asphalt material can be:
.1 Maintained at even temperature.
.2 Applied uniformly on variable widths of surface up to 5 m.
.3 Applied at readily determined and controlled rates from 0.14 to 0.18 L/m² with uniform pressure on new asphalt base course.
.4 Applied at readily determined and controlled rates from 0.27 to 0.36 L/m² with uniform pressures on milled ashpalt surfaces.
.5 Distribute in uniform spray without atomization at temperature required.
.2 Equipped with meter, registering travel in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.

.4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
.1 Measure temperature to closest whole number.

.5 Equipped with accurate volume measuring device or calibrated tank.

.6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

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 asphalt tack coat 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 APPLICATION

.1 Apply asphalt tack coat prior to HL4 surface asphalt placement only on clean and dry surface.

.2 Dilute asphalt emulsion with water at 1:1 ratio for application.
.1 Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply asphalt tack coat evenly to pavement surface at rate as directed by Departmental Representative, between 0.14 and 0.18 L/m^2.

.4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.5 Apply asphalt tack coat only when air temperature greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.

.6 Apply asphalt tack coat only on unfrozen surface.

.7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.9 Keep traffic off tacked areas until asphalt tack coat has set.

.10 Re-tack contaminated or disturbed areas as directed by Departmental Representative.

.11 Permit asphalt tack coat to set before placing asphalt pavement.

.12 Submit summary report within 7 days minimum of date of application and include information as follows:
.1 Total area tack coated.
.2 Quantity of tack coat used.
.3 Mean application rate.
.4 Actual product quantity used when using equipment on pressure distributors.
.5 Dipstick measurements or electronic printouts are acceptable.

.13 Carry out measurements in presence of Departmental Representative upon request.

.14 Inspect tack coat application to ensure uniformity.
.1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by Departmental Representative.
.2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

3.3 CLEANING

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

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.5-M91, Low Flash Petroleum Spirits Thinner.
.2 CAN/CGSB-1.74-2001, Alkyd Traffic Paint.

.3 Ontario Provincial Standard Specification (OPSS)
.1 OPSS 310, November 2010, Construction Specification for Hot Mix Asphalt.
.2 OPSS 1103, November 2013, Material Specification for Emulsified Asphalt.
.3 OPSS 1150, November 2010, Material Specification for Hot Mixed Asphalt.
.4 OPSS 1712, February 1991, Material Specification for Organic Solvent Based Traffic Paint.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section related to the placement of HL8 Base Coarse shall be paid by tonne of material supplied, placed, and compacted as per item 2.08 in the Unit Rate Table.

.2 Items under this Section related to the placement of the HL4 Surface Coarse shall be paid by tonne of material supplied, placed, and compacted as per item 2.11 in the Unit Rate Table.

.3 Items under this Section related to the application of paint lines shall be paid by linear metre as follows:
.1 100mm wide including stall parking and crosswalk as per item 2.16 in the Unit Rate Table.
.2 300mm wide stop bars as per item 2.17 in the Unit Rate Table.
.3 Barrier free striping and symbols as per item 2.18 in the Unit Rate Table.

1.3 SUBMITTALS

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

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Prime coat: SS-1 to OPSS 1103.

.2 Tack coat: SS-1 to OPSS 1103.

.3 Asphalt concrete: to OPSS 1150.

.4 Traffic paint: Alkyd yellow (505-308) and white (513-301) to CAN/CGSB-1.74 and OPSS 1712.

.5 Paint thinner: to CAN/CGSB-1.5.

PART 3 - EXECUTION

3.1 LIMITATIONS

.1 Implementation and completion of all pavement and pavement markings shall be done on weekends only.

.2 Contractor to provide 72 hours notices prior to closing parking areas off on weekends for paving and pavement marking operations.

3.2 PAVEMENT CONSTRUCTION

.1 Traffic markings shall not be applied earlier than 14 days after application of asphaltic concrete surface course on all phases that have been complted.

.2 Pavement thickness as per Contract Drawings.

.3 Application of tack coat: OPSS 1103. Apply only on clean and dry surface. Paint contact surfaces of curbs, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.4 Construction of asphalt concrete: to OPSS 310.

3.3 TRAFFIC MARKINGS

.1 Traffic markings shall not be applied earlier than 14 days after application of asphaltic concrete surface course has been completed on the entire site.

.2 Paint stop lines, centre lines and other pavement markings in accordance with manufacturers recommendations and as indicated on the Contract Drawings.

.3 Review layout with Department Representative prior to application.

.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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 22 13 - Rough Grading.

.2 Section 11 20 - Granular Base.

.3 Section 32 11 24 - Granular Sub-base.

.4 Section 32 16 15 - Concrete Walks, Curbs, and Gutters.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section related to sidewalk placement will be paid by square metre of concrete sidewalk installed including grade preparation, provision of, placement and compaction of Granular A base, forming, placing and finishing of concrete, installation of detectable warning plates, and stripping forms as per item 2.12 in the Unit Rate Table.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C117-13, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C136/136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600 kN-m/m^3).

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-3.3-2014, 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-A23.1-14/A23.2-14, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.

.4 Ontario Provincial Standard Specification (OPSS)
.1 OPSS.PROV 1010 November 2013, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Product Data: submit WHMIS MSDS.

.3 If materials have been tested by accredited testing laboratory testing laboratory approved by Departmental Representative within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 00.

.2 Joint filler, Curing Compound: in accordance with Section 03 30 00.

.3 Granular base: Granular A to OPSS.PROV 1010.

.4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.

.5 Kerosene: to CAN/CGSB-3.3.

.6 Detectable warning plate shall be uncoated cast iron materail with natural "rust" finish in accordance wit the AODA Act.

PART 3 - EXECUTION

3.1 GRADE PREPARATION

.1 Do grade preparation work in accordance with Section 31 22 13.

3.2 GRANULAR BASE

.1 Obtain Departmental Representative's approval of subgrade before placing granular base.

.2 Place 150mm thick granular base to lines, widths, and depths as indicated.

.3 Compact granular base layers to at least 95% of Standard Proctor Maximum Dry Density.

3.3 CONCRETE

.1 Obtain Departmental Representative's approval of granular base prior to placing concrete.

.2 Do concrete work in accordance with Section 03 30 00.

.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 Departmental Representative 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 Seal isolation joints with sealant approved by Departmental Representative.

3.7 CURING

.1 Cure concrete by adding moisture continuously in accordance with CAN/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.

.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 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 The work covered by this section includes the furnishing of all labor, materials, equipment, and incidentals for the construction and inspection of a segmental retaining wall including drainage system as shown on the Contract Drawings and Construction specifications. The work included in this section includes but is not limited to, the following:

.1 Furnishing and placement of leveling base.

.2 Furnishing and placement of drainage system.

.3 Furnishing and placement of geotextile.

.4 Furnishing and placement of segmental retaining wall units.

.5 Furnishing, placement and compaction of backfill drainage and retained soils.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section related to the construction of the precast concrete retaining walls shall be paid in square metres of exposed wall face, measured from top of finished asphalt to top of retaining wall installed and shall include excavation, preparation, and placement of granular base, subdrains, backfilling and compaction, etc. necessary for the wall installation as per item 2.13 in the Unit Rate Table.

1.3 RELATED SECTIONS

.1 Section 31 23 33 - Excavating, Trenching, and Backfilling.

.2 Section 33 44 00 - Storm Utility Drains.

1.4 REFERENCES

.1 American Society of Testing and Materials (ASTM):

.1 ASTM C33/C33M-13, Specification for Concrete Aggregates.

.2 ASTM C136-14, Method for Sieve Analysis for Fine and Coarse Aggregate.

.3 ASTM C140/C140M-15ae1, Sampling and Testing Concrete Masonry Units.

.4 ASTM C150/C150M-15, Specification for Portland Cement.

.5 ASTM C979/C979M-16, Specification for Pigments for Integrally Colored Concrete.

.6 ASTM C1372-14a, Standard Specification for Dry-Cast Segmental Retaining Wall Units.
.7 ASTM D698-12e2, Moisture Density Relationship for Soils, Standard Method.

.2 Canadian Standards Association (CSA):
.1 CSA A231.1-14/A231.2-14, Precast Concrete Paving Slabs/Precast Concrete Pavers.
.2 CSA A23.2A - Sieve Analysis of Fine and Coarse Aggregates.
.3 CSA A23.1-14/CSA A23.1-14, Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.
.4 CSA A23.4-14, Precast Concrete - Materials and Construction.
.5 CAN A3000-14, Cementitious Materials Compendium.

.3 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS.PROV 1010, November 2013, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
.2 OPSS 1352, November 1982, Material Specification for Precast Concrete Barriers.
.3 OPSS 1860, April 2012, Material Specification for Geotextiles.

1.5 SUBMITTALS

.1 Provide shop drawings sealed by a Professional Engineer registered in the Province of Ontario submitted in accordance with Section 01 33 00. Shop drawings to include:
.1 Retaining wall profile
.2 Cross sections
.3 Site Specific details (corners, etc.)
.4 Segmental retaining wall unit dimensions and details
.5 Project notes

.2 Sieve analysis of granular base and backfill materials.

.3 Segmental retaining wall blocks:
.1 Color will be selected by the Departmental Representative.
.2 Test results from an independent testing laboratory for compliance of segmental retaining wall unit requirements to ASTM C1372.
.3 Manufacturer's catalogue product data, installation manual, and material safety data sheets for the safe handling of the specified materials and products.

1.6 QUALITY ASSURANCE

.1 Retaining Wall Subcontractor Qualifications:
.1 Installation shall be by a contractor and crew, having successfully completed segmental retaining wall installations on projects of similar nature, complexity, or dollar cost.

.2 Contractor shall conform to all local, state/provincials licensing and bonding requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 General: Comply with Section 01 61 00.

.2 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.
.1 Coordinate delivery and retaining wall construction schedule to minimize interference with normal use of buildings adjacent to project.
.2 Deliver segmental retaining wall units to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift.
.3 Unload units at job site in such a manner that no damage occurs to the product.

.3 Storage and Protection: Store materials protected such that they are kept free from mud, dirt and other foreign materials.

.4 Coordinate delivery and building schedule to minimize interference with normal use of buildings adjacent to construction.

1.8 ENVIRONMENTAL CONDITIONS

.1 Do not install base or backfill material during heavy rain or snowfall.

.2 Do not install base backfill or segmental retaining wall units over frozen or saturated base or sub-base materials.

.3 Do not install frozen or saturated base or backfill materials.

.4 Do not install segmental retaining wall units on improperly prepared base material.

PART 2 - PRODUCTS

2.1 SEGMENTAL RETAINING WALL UNITS

.1 The segmental retaining wall units shall be solid concrete interlocking units with a split rock face appearance as follows:
.1 375mm Standard Unit 1000 x 375 x 200 mm high.
.2 750mm Standard Unit: 1000 x 750 x 200 mm high.
.3 1125mm Standard Unit: 1000 x 1125 x 200 mm high.
.4 438mm Coping Unit: 1000 x 438 x 200 mm high.
.5 Standard mm Unit: 380/250 x 312.5 x 200 mm high.
.6 Coping mm Unit: 380/250 x 312.5 x 100 mm high.

.2 Meet the following physical requirements:
.1 Average compressive strength of three coupons cut from units to be greater than 30 MPa with no individual coupon below 27 MPa when tested in accordance with ASTM C140.
.2 Average absorption of three specimens to be less than 6% with no individual unit greater than 7% when tested in accordance CSA A165-Series.

.3 Average loss of three specimens less than 600 g/m^2(17.7 oz/yd^2) after 50 freeze-thaw cycles immersed in a 3% saline solution when tested in accordance with OPSS 1352.

2.2 FOUNDATION SOIL

.1 The foundation shall be native undisturbed on-site soil. The foundation shall be examined and approved by the Departmental Representative prior to the placement of the base materials.

.2 Should the foundation soil not be suitable for bearing loads to be applied, the Departmental Representative shall provide guidance on the removal and replacement of suitable soil to meet the bearing requirement.

2.3 BASE MATERIAL

.1 Provide base materials as follows:
.1 The footing material shall be Granular A to OPSS.PROV 1010. Depth required behind wall according to retaining wall designer

.2 Compaction density of Granular A base material should be no less than 100% Standard Proctor Modified Dry Density according to ASTM D698 according to retaining wall designer

.3 Sieve according to CSA A23.2A.

2.4 BACKFILL MATERIAL

.1 Provide backfill material as follows:
.1 The backfill material shall be a non-frost susceptible, free draining sand and gravel material conforming to the OPSS.PROV 1010. Depth required behind wall according to retaining wall designer's requirements.

.2 Compaction density should be no less than 98% Standard Proctor density according to ASTM D698 per retaining wall designer

.3 Sieve according to CSA A23.2.

2.5 ACCESSORIES

.1 Provide accessory materials as follows:
.1 Subdrain to Section 33 44 00.

.2 Geotextile
.1 Non-Woven Type 2 geotextile to OPSS 1860.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Acceptance of Site Verification of Conditions:
.1 General contractor shall inspect, accept and certify in writing to the retaining wall installation subcontractor that site conditions meet specifications for the following items prior to installation of the retaining wall.
.2 Verify that sub-grade preparation, compacted density and elevations conform to the specified requirements.
.3 Provide written density test results for soil sub-grade materials to the Owner, General Contractor and retaining wall installation subcontractor.
.4 Verify location, alignment, and elevations of retaining wall.

.2 Do not proceed with installation of granular base and retaining wall blocks until sub-grade soil conditions are corrected by the General Contractor or designated subcontractor.

3.2 PREPARATION

.1 The Contractor shall retain an Engineer to oversee all aspects of construction of the retaining wall. The items to inspect include, but are not limited to the following:

.1 Verify that sub-grade preparation, compacted density and elevations conform to the specifications. The site must be stripped of all topsoil, unstable or unconsolidated materials to the grades indicated. Construction will not proceed until the sub-grade has been inspected and approved by the Engineer.

.2 Verify that aggregate base materials, thickness, compaction, surface tolerances, and elevations conform to the submitted Shop Drawings. Base material to extend a distance equal to the depth of the granular base in front of the intended face of wall and behind the back of the base block.

.3 Verify that the drainage pipe behind the wall has been installed and outlet according to the Shop Drawings.

.4 Verify the retaining wall units are placed in accordance with the Shop Drawings.

.5 Verify that the aggregate backfill materials, thickness, and compaction conform to the Shop Drawings.

.6 Verify the type, placement and location of the geotextile is in accordance with the Shop Drawings.

.2 The certifying Engineer must furnish the contractor with a letter indicating the retaining wall has been constructed in accordance with the Shop Drawings.

3.3 INSTALLATION

.1 The foundation soil shall be excavated or filled as required to the grades and dimensions shown on the Contract Drawings as per Section 31 23 33. The foundation soil shall be proof rolled and examined by the inspecting Engineer to ensure it meets the minimum strength requirements indicated on the Shop Drawings. If unacceptable foundation soil is encountered, the contractor shall excavate the material out to the satisfaction of the Engineer and Departmental Representative and replace with suitable material under the direction of the Engineer and Departmental Representative.

.2 Place geotextile as required.

.3 Spread the granular base evenly over the geotextile and compact to standard as indicated on the Shop Drawings.

.4 Level the granular base to level of underside of base block to +/- 3 mm off approved final base grade elevations. Care should be taken to ensure the base material is level front to back and side to side.

.5 Place the base row of retaining wall units as indicated on Shop Drawings. Care should be taken to ensure the blocks are aligned correctly and are level side to side and back to front and are in complete contact with the base material.

.6 Retaining wall units above the base course shall be placed according to the desired batter configuration. Units shall be places such there is a minimum 1/3 running bond between successive courses.

.7 Place drainage pipe behind the retaining wall units in the location indicated. The pipe should be laid at a gradient to ensure adequate drainage to outlet sources.

.8 Before the placement of the successive courses, the top of the laid units shall be swept clean to ensure no dirt, concrete or foreign particles interfere with the placement of the next course.

.9 Backfill between the back of the retaining wall units and the undisturbed native soil with the backfill material and compact. At no time should the units be stacked higher than two courses above the backfill material.

.10 Backfill should be placed in lifts no greater than 100 mm.

.11 Compaction equipment should not get closer than 300 mm.

.12 Cut units as required with a masonry saw.

.13 Retaining wall shall be finished at the top with coping units. The coping unit shall be secured to the course below it using a concrete adhesive.

3.4 FIELD QUALITY CONTROL

.1 The following are the maximum allowable deviations from the Contract Drawings:
.1 Vertical Control - +/- 32 mm over a 3000 mm distance
.2 Horizontal Location Control - +/- 32 mm over a 3000 mm distance
.3 Rotation - 2 degrees from published batter
.4 Bulging - 25 mm over a 3000 mm distance

.2 All retaining wall units shall be free of defects that would interfere with the proper placement of the unit or would significantly affect the structural integrity of the structure.

3.5 PROTECTION

.1 After work in this section is complete, the General Contractor shall be responsible for protecting work from damage due to subsequent construction activity on site.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Agriculture and Agri-Food Canada
.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment (CCME)
.1 PN 1340-2005, Guidelines for Compost Quality.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section will be paid by square metre of stripping of topsoil and sod as per item 1.03 in the Unit Rate Table. Stripped sod shall be disposed of off site. Stripped topsoil shall be stockpiled on site for re-use.

.2 Items under this Section will be paid by square metre of area graded and finished with fine grading of minimum depth 100mm topsoil and placement of sod as per item 2.20 in the Unit Rate Table. The price to include the maintenance of sod as defined in this Section.

1.3 DEFINITIONS

.1 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, and contain no toxic or growth inhibiting contaminates.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 TOPSOIL

.1 Topsoil for seeded areas and planting beds: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7% clay, and contain 2 to 10% organic matter by weight.

.2 Contain no toxic elements or growth inhibiting material.

.3 Finished surface free from:

.1 Debris and stones over 50 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Consistence: friable when moist.

2.2 SOD

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.

.1 Turf Grass Nursery Sod types:

.1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.

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

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

.2 Turf Grass Nursery Sod quality:

.1 Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.

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

.3 Mowing height limit: 35 to 65 mm.

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

2.3 SOIL AMENDMENTS

.1 Fertilizer

.1 Fertility: major soil nutrients present in the following amounts:

.2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
.3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
.4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
.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.

2.4 SOURCE QUALITY CONTROL

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

.2 Obtain approval from Departmental Representative of sod at source.

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

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 drawings and as instructed by Departmental Representative.

.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 AND SOD

.1 Begin topsoil stripping of areas after area has been cleared of brush 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 Stockpile in locations as directed by Departmental Representative.
.1 Stockpile height not to exceed 2 m.

.4 Dispose of unused topsoil off site.

.5 Protect stockpiles from contamination and compaction.

3.3 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.
.1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
.3 Remove debris, roots, branches, stones in excess of 50 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

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 100 mm.

.3 For sodded areas keep topsoil 15 mm below finished grade.

.4 Manually spread topsoil soil around trees, shrubs and obstacles.

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

3.6 FINISH GRADING

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

.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.

.1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.7 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 60 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

3.8 ACCEPTANCE

.1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

.2 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 m.
.4 Sodded areas have been cut minimum 2 times prior to acceptance.

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

3.9 SURPLUS MATERIAL

.1 Dispose of excess materials at a location identified by the facility.

3.10 CLEANING

.1 Proceed in accordance with Section 01 74 20.

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

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for constructing new outfall structures, precast maintenance holes.

1.2 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-Place Concrete.

.2 Section 31 23 33 - Excavating, Trenching and Backfilling.

.3 Section 33 31 13 - Public Sanitary Utility Sewerage Piping.

1.3 MEASUREMENT PROCEDURES

.1 The provision of a new twin inlet catch basin shall be paid by unit rate as per item 3.04 in the Unit Rate Table and shall be inclusive of benching, frame and grate, and all other related items required including excavation, granular base, and backfill to finished grade.

.2 The provision of a new dog house style storm maintenance hole shall be paid by unit rate as per item 3.05 in the Unit Rate Table and shall be inclusive of benching, frame and grate, access ladder, and all other related items required. Including excavation, granular base, and backfill to finished grade.

.3 The provision of a new sanitary maintenance hole shall be paid by unit rate as per item 4.05 in the Unit Rate Table and shall be inclusive of benching, frame and grate, access ladder, and all other related items required including excavation, granular base, and backfill to asphalt sub-base.

.4 Adjustments of existing maintenance hole units shall be paid by unit rate as per item 3.07 for storm structures and item 4.06 for sanitary structures and shall be include the provision of adjustment units as required as well as new frame and grate.

1.4 REFERENCES

.1 American Society for Testing and Materials (ASTM International)

.1 ASTM A48/A48M-03(2012), Standard Specification for Gray Iron Castings.

.2 ASTM C139-14, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes (Metric).
.3 ASTM C478M-15a, Standard Specification for Precast Reinforced Concrete Manhole Sections.
.4 ASTM C618-08a(2015), Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
.5 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 Canadian Standards Association (CSA International)
.1 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.2 CSA-A23.1-14/A23.2-14, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
.3 CSA-A165 Series-04(R2014), CSA Standards on Concrete Masonry Units.
.4 CAN/CSA-G30.18-09(R2014), Carbon steel bars for concrete reinforcement.

.3 Ontario Provincial Standard Specification (OPSS)
.1 OPSS 405, November 2008, Construction Specification for Pipe Subdrains.
.2 OPSS 407, November 2015, Construction Specification for Maintenance Hole, Catch Basin, Ditch Inlet and Valve Chamber Installation Cibs.
.3 OPSS 701, November 2009, Construction Specification for Watermain Installation in Open Cut.
.4 OPSS 705, November 2014, Construction Specification for Flexible Delineator Posts.
.5 OPSS.PROV 1010, November 2013, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

.4 Ontario Provincial Standard Drawings (OPSD)
.1 OPSD 405.010, November 2013, Maintenance Hole Steps.

1.5 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work. Include manufacturer's drawings, information and shop drawings where pertinent.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Cast-in-place concrete:
.1 In accordance with Section 03 30 00.

.2 Precast maintenance hole units: to OPSS 701.010.

.3 Precast catch basin units: to OPSS 705.010.

.4 Joints: to be made watertight using rubber rings, bituminous compound, epoxy resin cement or cement mortar.

.5 Ladder rungs: to OPSD 405.010.

.6 Frames, gratings, covers as indicated on the Contract Drawings.

.7 Granular bedding and backfill: in accordance with OPSS.PROV 1010.
.1 150 mm Granular 'A' compact to minimum 98% Standard Proctor Maximum Dry Density.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

.1 Excavate and backfill in accordance with Section 31 23 33 and as indicated in the Contract Drawings.

.2 Obtain approval of Departmental Representative before installing maintenance holes or catch basins.

3.2 CONCRETE WORK

.1 Do concrete work in accordance with Section 03 30 00.

3.3 INSTALLATION

.1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

.2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.

.3 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.

.4 Cast bottom slabs directly on undisturbed ground.

.5 Set precast concrete base on 150 mm minimum of granular bedding compacted to minimum 98% Standard Proctor Maximum Dry Density.

.6 Precast units:
.1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base. Make each successive joint watertight with Departmental Representative approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination thereof.
.2 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
.3 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.7 For sewers:
.1 Place stub outlets and bulkheads at elevations and in positions indicated and as per Section 33 31 13.
.2 Bench to provide a smooth U-shaped channel. Side height of channel to be 0.75 times full diameter of sewer. Slope adjacent floor at 1 in 20. Curve channels smoothly. Slope invert to establish sewer grade.

.8 Compact granular backfill to minimum 98% Standard Proctor Maximum Dry Density.

.9 Place unshrinkable backfill in accordance with Section 31 23 33 as required.

.10 Set frame and cover to required elevation on no more than four courses of brick. Make brick joints and join brick to frame with cement mortar. Parge and make smooth and watertight.

.11 Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.

.12 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

.13 Install safety platforms in maintenance holes having depth of 5 m or greater, as indicated.

.14 Remove existing gratings, frames and I beams and store for re-use at locations designated by Departmental Representative.

.15 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. When amount of raise is less than 600 mm use standard maintenance hole brick, moduloc or grade rings.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Ontario Provincial Standard Specification (OPSS)

.1 OPSS.PROV 201, November 2011, Construction Specification for Clearing, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders

1.2 MEASUREMENT PROCEDURES

.1 Isolated tree removal shall be paid by tree removed (including stump and roots) from landscaped areas as per item 1.02 in the Unit Rate Table.

.2 Clearing and grubbing includes tree and underbrush removals in all non-landscaped areas and is paid by square metre of area cleared under item 1.01 in the Unit Rate Table.

1.3 DEFINITIONS

.1 Clearing consists of cutting off trees of all trunk diameters and brush vegetative growth to not more than a specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.

.2 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.3 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of all fallen timber and surface debris.

.4 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than a specified depth below existing ground surface.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.5 QUALITY ASSURANCE

.1 Do construction occupational health and safety in accordance with Section 01 35 29.

.2 Safety Requirements: worker protection.

.1 Workers must wear protective clothing when performing the work.
.2 Workers must not eat, drink or smoke while applying herbicide material.
.3 Clean up spills of preservative materials immediately with absorbent material and safely discard to landfill.

1.6 STORAGE AND PROTECTION

.1 Prevent damage to trees, landscaping, natural features, bench marks, existing structures, existing pavement, utility lines, site appurtenances, water courses, and root systems of trees which are to remain.
.1 Repair any damaged items to approval of Departmental Representative.
.2 Replace any trees designated to remain, if damaged, as directed by Departmental Representative.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.2 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as saleable timber.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Soil Material for Fill:
.1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
.2 Remove and store soil material for reused.

PART 3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to Section 01 35 43.

.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 PREPARATION

.1 Inspect site and verify with Departmental Representative, items designated to remain.

.2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

.3 Notify utility authorities before starting clearing and grubbing.

.4 Keep roads and walks free of dirt and debris.

3.3 CLEARING

.1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.

.2 Clear as indicated by Departmental Representative, by cutting at a height of not more than 200 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 200 mm above ground surface.

.3 Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative.

.4 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

3.4 ISOLATED TREES

.1 Cut off isolated trees as indicated by Departmental Representative at height of not more than 200 mm above ground surface.

.2 Grub out isolated tree stumps.

3.5 GRUBBING

.1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.

.2 Grub out stumps and roots to not less than 200 mm below ground surface.

.3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m^3.

.4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.6 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials to disposal area as indicated by Departmental Representative.

.2 Cut timber greater than 125 mm diameter to 3048 mm lengths and stockpile as indicated. Stockpiled timber becomes property of Departmental Representative.

.3 Mulch and stockpile cleared and grubbed vegetative material on site as directed by Departmental Representative.

.4 Remove diseased trees identified by Departmental Representative and dispose of this material to approval of Departmental Representative.

3.7 FINISHED SURFACE

.1 Leave ground surface in condition suitable for immediate grading operations to approval of Departmental Representative.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast-in-Place Concrete.

.2 Section 31 23 33 - Excavating, Trenching and Backfilling.

1.2 MEASUREMENT PROCEDURES

.1 Items under this Section related to the installation of new fire hydrant, lead, and valve shall be paid by unit rate as per item 5.03 in the Unit Rate Table inclusive of granular bedding and all associated equipment.

.2 Provision of watermain for hydrant connections, forcemain to valve, will be paid by linear metre of watermain installed including bedding and compaction to finished grade or roadway base material, as applicable as per item 5.02 in the Unit Rate Table.

1.3 REFERENCES

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
.1 ANSI/AWWA C651-05, Disinfecting Water Mains.
.2 C800-05: AWWA Standard for Underground Service Line Valves and Fittings.
.3 C900-07: AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution
.4 AWWA B300-10, Hypochlorites.
.5 AWWA B301-10, Liquid Chlorine.
.6 AWWA B303-10, Sodium Chlorite.
.7 AWWA C651-05, Disinfecting Water Mains.
.8 AWWA C800-05, Underground Service Line Valves and Fittings (Also Included: Collected Standards for Service Line Materials).

.2 American Water Works Association (AWWA)/ Manual of Practice.
.1 AWWA M17 (2006), Installation, Field Testing, and Maintenance of Fire Hydrants.

.3 Canadian Standards Association (CSA International)
.1 CSA B137 Series-09 (2011), 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 B137.3-05, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.

.4 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.5 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA)

.6 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S520-07, Standard for Fire Hydrants.
.2 CAN4-S543-M84, Internal-Lug, Quick Connect Couplings for Fire Hose.

.7 Ontario Provincial Standard Specification (OPSS)
.1 OPSS.PROV 1010, November 2013, Material Specification for Aggregates - Base, Subbase, Select Subgrade and Backfill Material.
.2 OPSS 701, November 2009, Construction Specification for Watermain Installation in Open Cut.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Submit manufacturer's test data and certification that pipe materials meet requirements of this section at least 2 weeks prior to beginning work. Include manufacturer's drawings, information and shop drawings where pertinent.

.3 Pipe certification to be on pipe.

1.5 CLOSEOUT SUBMITTALS

.1 Provide data to produce record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of air and vacuum release valves, hydrant details, maintenance and operating instructions in accordance with Section 01 78 00.
.1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants, as applicable.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.7 SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services. Coordinate with Site Facility Management.

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

1.8 EXISTING CONDITIONS

.1 Contractor to confirm existing watermain materials (by excavation, hydroexcavation, etc.) prior to ordering any fittings, appurtenances, etc.

PART 2 - PRODUCTS

2.1 PIPE, JOINTS AND FITTINGS

.1 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900, pressure class 150, DR 18, 1 MPa gasket bell end, cast iron outside diameter.
.1 CSA-B137.3, PVC series 160, 1.1 MPa elastomeric gasket coupling.
.2 Non-metallic fittings shall be injection moulded with push on gasketted joints to AWWA C-907 and CSA B137.2.
.3 Cast iron fittings to ANSI/AWWA C110/A21.10 or compact ductile iron to AWWA C153/A21.53 and shall be cement lined to AWWA C104/A21.4. Cast Iron shall only be used where compact ductile iron fittings are not available.

2.2 PIPE BEDDING AND SURROUND

.1 Granular material to the following requirements:
.1 Granular A to OPSS.PROV 1010 maximum size 19mm.
.

2.3 PIPE

.1 Sodium hypochlorite Calcium hypochlorite Liquid chlorine Sodium chlorite to AWWA B300 AWWA B301, AWWA B303 to disinfect water mains.

2.4 JOINT RESTRAINTS

.1 Serrated (machined) ring type joint restraints for PVC pipe shall meet the requirements of Uni-Bell B-13 or ASTM F1 2.3, and AWWA C-111 where appropriate, and be listed by ULC or FM.

.2 Wedge action type joint restraints for PVC pipe shall meet the requirements of Uni-Bell B-13 or ASTM F1674, and AWWA C-111 where appropriate, and be listed by ULC or FM.

2.5 VALVES AND VALVE BOXES

.1 Valves to open counter clockwise.

.2 Gate valves: Resilient Wedge to AWWA C509, standard iron body, bronze - mounted with inside screw, non-rising spindle and a 50 mm operating nut. Valves to have mechanical joint ends. Valves to open counter clockwise.

.3 Valve boxes: Cast iron valve boxes shall be a screw type box with a No. 6 Base as supplied by Bibby, Mueller or Star. Lid shall read "WATER" or large "W". The valve box must be raised to final grade.

2.6 HYDRANTS

.1 Hydrants shall conform to AWWA C502 for Dry Barrel Hydrants and shall open counter clockwise by a 32 mm square operating nut. Hydrants shall have tapped drain ports, 150 mm mechanical joint inlet with brass to brass fittings on the main valve seat, two 63.5 mm (2.5 in) hose nozzles spread 180 degrees apart and a 114.3 mm (4.5 in) pumper nozzle with a 100 mm ULC approved Stortz connection. Hydrants shall be connected to the main using 150 m m lead, 150 gate valve and anchor tee. Hydrants shall be supplied for a minimum 2.3 m depth of trench.

.2 Hydrants shall be painted red with a high gloss exterior paint over a quick dry oxide primer.

.3 The watermain diameter (in inches and millimeters`) to which the hydrant is connected shall be painted in black letters 200 mm high on the face of the hydrant barrel immediately below the pumper nozzle.

2.7 ANODES

.1 Packaged anodes shall be zinc Z-24-48 (24lb) manufactured using a high purity zinc (99.99% pure zinc) conforming to ASTM B-418 Type II. The anode shall have an average current efficiency of 90% and provide an open circuit potential with a minimum 1.10 Volt D.C. as measured with respect to copper / copper sulphate reference electrode. The zinc casting shall have a minimum 3.2 mm (0.125") diameter galvanized steel core wire throughout its length and shall be packaged in a cardboard or cloth container approximately 100 mm in diameter. The depolarising material surrounding the zinc casting shall be composed of a gypsum/bentonite base material having an electrical resistivity less than 50 ohm/c m wet. An insulated copper wire (AWG #10/7 strand), 2m minimum in length shall be brazed to the end of the core wire.

2.8 TRACER WIRE

.1 Tracer wire shall be #8 gauge TWU multi-strand copper.

.2 Splices and other wire to wire connections shall be made by soldering or using waterproof connectors (type to be approved by Departmental Representative) or by using copper split bolt connectors.

2.9 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular Material 'A' as per OPSS.PROV 1010 maximum size 19 mm as indicated in the Contract Drawings.

2.10 BACKFILL MATERIAL

.1 In accordance with Section 31 23 33.

2.11 PIPE DISINFECTION

.1 Sodium hypochlorite or Calcium hypochlorite Liquid chlorine to disinfect water mains.

.2 Undertake disinfection of water mains in accordance with ANSI/AWWA C652.

.3 Submit detailed disinfection plan to Departmental Representative for review by the Regional Environmental Coordinator prior to any disinfection work being undertaken.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Clean pipes, fittings, valves, hydrants, and appurtenances of accumulated debris and water before installation.
.1 Ensure any work completed on potable water lines to follow construction procedures in accordance with AWWA C562.
.2 Inspect materials for defects to approval of Departmental Representative.
.3 Remove defective materials from site as directed by Departmental Representative.

3.2 TRENCHING

.1 Do trenching work in accordance with Section 31 23 33.

.2 Trench depth to provide cover over pipe of not less than 1.5 m from finished grade or as indicated.

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

3.3 GRANULAR BEDDING

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

.2 Do not place material in frozen condition.

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

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

.5 Compact each layer full width of bed to at least 98% Standard Proctor Maximum Dry Density.

3.4 PIPE

.1 Lay pipes to manufacturer's standard instructions and specifications. Do not use blocks except as specified.

.2 Join pipes in accordance with manufacturer's recommendations.

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

.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.

.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 or as otherwise approved by Departmental Representative.

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

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

.19 Do not lay pipe on frozen bedding.

.20 Do hydrostatic and leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material.

.21 Backfill remainder of trench.

3.5 VALVE INSTALLATION

.1 Install valves to manufacturer's recommendations at locations as indicated.

.2 Support valves located in valve boxes or valve chambers 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 For thrust blocks: do concrete Work in accordance with Section 03 30 00.

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

.3 Keep joints and couplings free of concrete.

.4 For restrained joints: only use restrained joints approved by Departmental Representative.

3.7 HYDROSTATIC AND LEAKAGE TESTING

.1 Do tests in accordance with AWWA C600 C603.

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

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

.4 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes between joints with approved granular material placed.

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

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

.7 Open valves.

.8 Expel air from main by slowly filling main with potable water.
.1 Install corporation stops at high points in main where no air-vacuum release valves are installed.
.2 Remove stops after satisfactory completion of test and seal holes with plugs.

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

3.8 PIPE SURROUND

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

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

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

.4 Do not place material in frozen condition.

.5 Compact each layer from pipe invert to mid height of pipe to at least 98% Standard Proctor Maximum Dry Density.

3.9 BACKFILL

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

.2 Do not place backfill in frozen condition.

3.10 FLUSHING AND DISINFECTING

.1 Flushing and disinfecting operations: witnessed by Departmental Representative.

.1 Submit to Departmental Representative, at least 2 weeks advance of proposed date when disinfection will begin, a detailed disinfection plan which is in accordance with AWWA C652. Notify Departmental Representative at least 4 days in advance of proposed date when disinfecting operations will begin.

3.11 DECHLORINATION

.1 All water wasted shall be discharged into the stormwater system and shall be neutralized to provide a total chlorine residual of less than 0.2 mg/l. The Departmental Representative will monitor the discharge of waste water. Should tests show a residual greater than 0.2 mg/l , the discharge shall be ceased immediately and the procedure modified to meet less than the 0.2 mg/l objective.

.2 Where detrimental effects may be suffered by plants and/or animals in the natural environment, the wasted water shall be neutralized to provide a total chlorine residual of less than 0.002 mg/l (2 ppb) (Provincial Water Quality Objective) at the outfall. The Departmental Representative will monitor the discharge of waste water. Should tests show a residual greater than 3.12 mg/l, the discharge shall be ceased immediately the Departmental Representative shall be notified, and the procedure modified to meet the less than 0.002 mg/l objective.

.3 The Contractor shall flush every part of the water system including fire hydrant leads, stubs for future watermains and services to remove all super chlorinated water.

3.12 SURFACE RESTORATION

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33 - Excavating, Trenching and Backfilling.

.2 Section 33 05 14 - Maintenance Holes and Catch Basin Structures.

1.2 MEASUREMENT PROCEDURES

.1 Sanitary sewers installed under this section shall be paid by linear metre including excavation, bedding, supply and placement of sewer installed, and compaction of subbase as per item 4.04 in the Unit Rate Table.

.2 Sanitary sewers abandoned shall be paid by each sewer abandoned as Per Item 4.02 in the Unit Price Table and shall include all excavation, backfill, material and equipment to compete the work.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM C14M-15, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).

.2 ASTM C76M-15, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).

.3 ASTM C117-13, Standard Test Method for Materials Finer Than 75 (MU) m (No. 200) Sieve in Mineral Aggregates by Washing.

.4 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.5 ASTM D698-12e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft4-lbf/ft^3 (600 kN-m/m^3)).

.6 ASTM D3034-08, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.2 Canadian Standards Association (CSA International)

.1 CSA B1800-15, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.8, B182.11 and B182.13).

.1 CSA B182.1(2012), Plastic Drain and Sewer Pipe and Pipe Fittings.

.2 CSA B182.2 (2012), PVC Sewer Pipe and Fittings (PSM Type).

.3 CSA B182.11 (2012), Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

.3 Ontario Provincial Standard Specification (OPSS)
.1 OPSS.PROV 1010, November 2013, Material Specification for Aggregates - Base, Subbase, Select Subgrade and Backfill Material.

1.4 DEFINITIONS

.1 Pipe section is defined as length of pipe between successive manholes and/or between manhole and any other structure which is part of sewer system.

1.5 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.

.3 Submit to Departmental Representative for testing at least 2 weeks prior to beginning Work, following samples of materials proposed for use:.

.4 Ensure certification is marked on pipe.

.5 Submit manufacturers information data sheets and instructions in accordance with Section 01 33 00.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.8 SCHEDULING

.1 Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

.3 Notify Departmental Representative and building manager superintendent 24 hours minimum in advance of any interruption in service.

PART 2 - PRODUCTS

2.1 PLASTIC PIPE

.1 Type PSM Polyvinyl Chloride (PVC): to CSA-B182.2.
.1 Standard Dimensional Ratio (SDR): 35.
.2 Locked-in Separate gasket and integral bell system.
.3 Nominal lengths: 6 m.

2.2 CEMENT MORTAR

.1 Portland cement: to CAN/CSA-A3001, normal type GU.

.2 Mix mortar one part by volume of cement to two parts of clean, sharp sand mixed dry.
.1 Add only sufficient water after mixing to give optimum consistency for placement.
.2 Do not use additives.

2.3 PIPE BEDDING AND SURROUND MATERIALS

.1 Granular material to OPSS.PROV 1010, Granular 'A' and as indicated on the Contract Drawings.

2.4 BACKFILL MATERIAL

.1 As indicated in the Contract Drawings.

.2 Unshrinkable fill: to Section 31 23 33.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Clean and dry pipes and fittings before installation.

.2 Obtain Departmental Representative's approval of pipes and fittings prior to installation.

3.2 TRENCHING

.1 Do trenching Work in accordance with Section 31 23 33.

.2 Do not allow contents of any sewer or sewer connection to flow into trench.

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

3.3 CONCRETE BEDDING AND ENCASEMENT

.1 Do concrete Work in accordance with Section 03 30 00.
.1 Place concrete to details as indicated directed by Departmental Representative.

.2 Position pipe on concrete blocks to facilitate placing of concrete.
.1 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

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

3.4 GRANULAR BEDDING

.1 Place bedding in unfrozen condition.

.2 Place granular bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
.1 Do not use blocks when bedding pipe.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 98% Standard Proctor Maximum Dry Density.

.6 Fill excavation below bottom of specified bedding adjacent to manholes or structures with compacted bedding material common backfill lean mix concrete.

3.5 INSTALLATION

.1 Lay and join pipes to: ASTM C12.

.2 Lay and join pipes in accordance with manufacturer's recommendations and to approval of Departmental Representative.

.3 Handle pipe using methods approved by Departmental Representative.

.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.4 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.
.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.5 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.6 Do not exceed maximum joint deflection recommended by pipe manufacturer.

.7 Do not allow water to flow through pipe during construction, except as may be permitted by Departmental Representative.

.8 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.9 Install plastic pipe and fittings in accordance with CSA B182.11.

.10 Pipe jointing:
.1 Install gaskets in accordance with manufacturer's recommendations as indicated.
.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 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 At rigid structures, install pipe joints not more than 1.2 m from side of structure.
.9 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

.11 When stoppage of Work occurs, block pipes as directed by Departmental Representative to prevent creep during down time.

.12 Plug lifting holes with pre-fabricated plugs approved by Departmental Representative, set in shrinkage compensating grout.

.13 Cut pipes as required for special inserts, fittings or closure pieces as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.14 Make watertight connections to manholes and septic tank as indicated on Contract Drawings.
.1 Use shrinkage compensating grout when suitable gaskets are not available.

3.6 PIPE SURROUND

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
.1 Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
.1 Do not dump material within 2 m of pipe.

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

.5 Compact each layer from pipe invert to mid height of pipe to at least 98% Standard Proctor Maximum Dry Density.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 98% Standard Proctor Maximum Dry Density.

.7 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

3.7 BACKFILL

.1 Place backfill material in unfrozen condition.

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

.3 Under paving and walks, compact backfill to at least 98% Standard Proctor Maximum Dry Density.
.1 In other areas, compact to at least 98% Standard Proctor Maximum Dry Density.

.4 Place unshrinkable fill in accordance with Section 31 23 33.

3.8 FIELD TESTING

.1 Repair or replace pipe, pipe joints or bedding found defective.

.2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Provide CCTV video of all sewerage piping installed under this contract.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 35 05 16 - Aggregate Materials.

.2 Section 31 23 33 - Excavating, Trenching and Backfilling.

1.2 MEASUREMENT PROCEDURES

.1 CSP culvert pipe shall be paid by linear metre including supply, excavation, bedding, placement, compaction of backfill to pavement sub-base, supply and placement of rip rap end treatments as per item 3.02 in the Unit Price Table.

.2 Storm subdrain and clearstone shall be paid by linear metre of subdrain installed complete with excavation, clearstone, geofabric, backfill to rough grade as per item 3.06 in the Unit Rate Table.

1.3 REFERENCES

.1 ASTM International
.1 ASTM C 117-13, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C 136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
.4 ASTM D 1248-12, Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 CSA International
.1 CAN/CSA G401-12, Corrugated Steel Pipe Products.

.4 Ontario Provincial Standard Specification (OPSS)
.1 OPSS.PROV 1010, November 2013, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
.2 OPSS.PROV 1860, April 2012, Material Specification for Geotextiles.

1.4 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.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

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

.3 Storage and Handling Requirements:
.1 Store materials in accordance with manufacturer's recommendations.
.2 Store and protect pipes from damage.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 CORRUGATED STEEL PIPE

.1 Corrugated steel pipe: to CAN/CSA-G401.

2.2 SUBDRAIN PIPE

.1 100 mm D1248-05 complete with Type II non-woven geotextiles to OPSS.PROV 1860.

2.3 GRANULAR BEDDING AND BACKFILL

.1 Granular bedding and backfill material to Section 31 05 16 and following requirements:
.1 Granular A to OPSS.PROV 1010.

PART 3 - EXECUTION

3.1 TRENCHING

.1 Do trenching Work in accordance with Section 31 23 33.

3.2 BEDDING

.1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.

.2 Place 200 mm minimum thickness of approved granular material on bottom of excavation and compact to 98% SPMDD.

.3 Place bedding in unfrozen condition.

3.3 BACKFILLING

.1 Place granular backfill material, in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.

.2 Compact each layer to 98% SPMDD.

3.4 CLEANING

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

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

.3 Waste Management: separate waste materials in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for storm sewers, subdrains, and culverts.

1.2 RELATED SECTIONS

.1 Section 31 23 33 - Excavating, Trenching and Backfilling.

1.3 MEASUREMENT

.1 Storm Sewer pipe shall sbe paid by linear metre including supply, excavation, bedding placement, compaction of backfill to pavement sub-base, as per Item 3.03 in the Unit Price Table.

.2 Items under this section related to the installation of perforated pipe shall be paid by linear metre including supply, excavation, bedding, placement, compaction of backfill to pavement sub-base as per item 3.06 of the Unit Rate Table.

1.4 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM D3034-15, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.2 Canadian Standards Association (CSA International)
.1 CSA B1800-15, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.8, B182.11 and B182.13).
.1 CSA B182.1(2012), Plastic Drain and Sewer Pipe and Pipe Fittings.
.2 CSA B182.2 (2012), PVC Sewer Pipe and Fittings (PSM Type).
.3 CSA B182.11 (2012), Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

.3 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.4 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.5 Ontario Provincial Standard Specification (OPSS)
.1 OPSS.PROV 101o, November 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material.

1.5 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.

.3 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.

.4 Certification to be marked on pipe.

.5 Submit to Departmental Representative 1 copy of manufacturer's installation instructions.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.7 SCHEDULING

.1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

PART 2 PRODUCTS

2.1 PLASTIC PIPE

.1 Type PSM Polyvinyl Chloride (PVC): to CSA-B182.2.
.1 Standard Dimensional Ratio (SDR): 35.
.2 Locked-in Separate gasket and integral bell
.3 Nominal lengths: 6 m.

2.2 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular material: to OPSS.PROV 1010 for:
.1 Granular A, maximuOm size 19.0 mm.
.2 Granular B, Type I, maximum size 26.5 mm.

2.3 BACKFILL MATERIAL

.1 As indicated in the Contract Drawings and in accordance with Section 31 23 33.

PART 3 EXECUTION

3.1 PREPARATION

.1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

3.2 TRENCHING

.1 Do trenching Work in accordance with Section 31 23 33.

.2 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.

3.3 GRANULAR BEDDING

.1 Place bedding in unfrozen condition.

.2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 98% Standard Proctor Maximum Dry Density.

.6 Fill excavation below bottom of specified bedding adjacent to maintenance holes or catch basins with compacted bedding material.

3.4 INSTALLATION

.1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.

.2 Handle pipe using methods approved by Departmental Representative.
.1 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.
.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.4 Begin 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 When any stoppage of Work occurs, restrain pipes as directed by Departmental Representative, to prevent "creep" during down time.

.8 Plug lifting holes with Departmental Representative approved prefabricated plugs, set in shrinkage compensating grout.

.9 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.10 Make watertight connections to maintenance holes and headwalls.
.1 Use shrinkage compensating grout when suitable gaskets are not available.

.11 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
.1 Joint to be structurally sound and watertight.

3.5 PIPE SURROUND

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
.1 Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
.1 Do not dump material within 2 m of pipe.

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

.5 Compact each layer from pipe invert to mid height of pipe to at least 98% Standard Proctor Maximum Dry Density.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 98% Standard Proctor Maximum Dry Density.

.7 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

3.6 BACKFILL

.1 Place backfill material in unfrozen condition.

.2 Place backfill material, above pipe surround, in uniform layers not exceeding 200 mm compacted thickness to at least 90% Standard Proctor Maximum Dry Density up to grades as indicated.

.3 Place unshrinkable backfill in accordance with Section 31 23 33.

3.7 FIELD TESTING

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Provide CCTV of all storm utility drains installed under this contract.

END OF SECTION

ANNEX A

GEOTECHNICAL REPORT

April 12, 2016

Assad Ghubril
Senior Project Manager
Public Works and Government Services Canada
4900 Yonge Street
Toronto, Ontario M2N 6A6

Subject: Geotechnical Investigation, Site Development and Parking Expansion
Beaver Creek Institution, Gravenhurst, Ontario
PWGSC Project No. R.079593.001
WSP Project No. 141-14303-09

Dear Mr. Ghubril:

WSP Canada Inc. (WSP) was retained by Public Works and Government Services Canada (PWGSC) to conduct a geotechnical investigation at the Beaver Creek Institution, located to the east of the Town of Gravenhurst, Ontario. The site is a fully operational federal correctional facility and accessed from County Road 36, east of Highway 11. The subject parking area is to the north of the actual correctional centre, generally separate from the facility. The investigation is part of the site development and parking lot expansion study, as commissioned by Correctional Services Canada (CSC) which included site topographic survey, preparation of grading plans and construction tendering and administration.

The focus of the geotechnical investigation was to assess the pavement structure of the existing parking lot and establish proposed rehabilitation, investigate the depth to bedrock in the proposed parking lot area to determine construction and design requirements for the parking lot expansion and determination of percolation rates for infiltration based stormwater management. A visual inspection of the site confirmed that some potholes exist, and in some locations the asphalt has completely deteriorated.

The work included a geotechnical subsurface investigation, soil sampling and laboratory soil analysis. Details of methodology of the work program and our findings are summarized as follows.

1. Methodology

1.1 Borehole Investigation

Ten (10) pavement boreholes, designated as BH15-1 through BH15-10, were advanced to approximately 1.5 m below ground level (mBGL) to determine the subsurface profile in the parking lot area. The boreholes were advanced using a solid stem auger attached to a mini-excavator operated under the supervision of a qualified WSP geotechnical technician. The boreholes were inspected, sampled and logged onsite. Boreholes were backfilled with existing soil cuttings and the surface asphalt layer was reinstated with cold patch asphalt. Borehole logs are attached as Appendix A, and a borehole location plan is included as Figure 1.

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1.2 Bedrock Probes

Relative soil density and overall depth to bedrock was evaluated using a dynamic probe test (DPT15-3 and DPT15-4) which consists of an 8 kg weight freefalling 750 mm onto a 19 mm diameter steel bar to determine the relative density of non-cohesive soils and the consistency of cohesive soils based on the number of blows for every 150 mm of penetration. This information is to be utilized for design at the proposed parking lot expansion, specifically to identify the need for any bedrock blasting and overall cut/fill analysis.

1.3 Test Pit Investigation

Two (2) test pits, designated as TP15-1 and TP15-2, were excavated to approximately 1.1 m below ground level (mBGL) to determine the subsurface profile adjacent to the parking lot area. The test pits were excavated using a mini-excavator, operated under the supervision of a qualified WSP geotechnical personnel, who inspected, sampled and logged all encountered soil horizons. A 360 mm high by 300 mm bottomless plastic pail was placed at the bottom of the test pit and pushed until approximately 50 mm of the bucket was firmly seated into the underlying sands. The pail was filled with water to its top and the water level measured and recorded every minute up to 15 minutes to determine the percolation rate into the underlying soils. Test pits were backfilled with the excavated soil.

Test Pit logs are attached as Appendix A, and excavation locations are included on the borehole location plan seen as Figure 1.

1.4 Laboratory Tests

Upon completion of the borehole investigation all soil samples were reviewed by the project lead and seven (7) soil samples from the drilling investigation were selected for particle size analysis (per ASTM D422). Results are included on the appended borehole logs and laboratory results are attached as Appendix B.

2. Findings

2.1 Subsurface Profile

Boreholes BH15-1 through BH15-10, bedrock probes DPT-1 through DPT-3 and test pit TP15-1 and TP15-2 were advanced at locations clear of underground utilities to depths varying from 1.2 mBGL to 1.6 mBGL. Boreholes were extended beyond the inferred pavement structure into the underlying subgrade material. All boreholes encountered asphalt at surface varying from 50 mm to 175 mm thick, overlying a granular material consisting of gravelly sand to sand and gravel and underlain by a sand subgrade with trace to some silt and a trace of gravel. At the test pit locations surficial organic soils were encountered. All boreholes were terminated in the sand stratum. Detailed descriptions of individually encountered materials are described below.

2.1.1 Asphalt

Asphalt was encountered at the surface of each borehole and was found to be generally between 50 mm and 75 mm thick with one borehole encountering a substantially thicker layer of asphalt found to be 175 mm in thickness.

2.1.2 Fill

Granular fill material was encountered underlying the asphalt at all boreholes. No granular fill was encountered at the test pit locations. The material ranged in thickness from 0.5 m up to 0.8 m. The fill material was light brown to brown in colour and contained a trace to some silt and a trace of gravel. The material is presumed to be a granular fill used for the original parking lot construction base material. The fill was moist at the time of the investigation.

A laboratory particle size distribution analysis was completed on select samples of the granular fill layers from beneath the asphalt layer at BH15-1, BH15-3, BH15-4, BH15-6 and BH15-8. The test results are as follows (Unified Classification System):

- Gravel (greater than 4.75 mm) 27 % to 36%
- Sand (0.075 mm – 4.75 mm sieve size) 49 % to 63 %
- Silt & Clay (< 0.075 mm sieve size) 10 % to 16 %

The test results are presented on the borehole logs in Appendix A and the particle size distribution curve is included in Appendix B.

2.1.3 Sand

Sand was encountered underlying the granular fill material at each investigation location (test pits and boreholes) to the termination depth. The material was encountered at depths ranging from 0.3 mBGL to 1.1 mBGL and was up to 1.9 m thick. All boreholes and test pits were terminated in sand. The material was light brown to orange brown in colour and contained a trace amount of silt/clay and a trace amount of gravel.

A laboratory particle size distribution analysis was completed on two (2) select samples of the sand layer BH15-2 and BH15-7, from 0.8 mBGL to 1.5 mBGL. The test results are as follows (Unified Classification System):

- Gravel (greater than 4.75 mm) 1 % to 3 %
- Sand (0.075 mm – 4.75 mm sieve size) 93 % to 96 %
- Silt & Clay (< 0.075 mm sieve size) 3 % to 4 %

The test results are presented on the borehole logs in Appendix A and the particle size distribution curve is included in Appendix B.

2.1.4 Groundwater

Groundwater was not encountered in any of the boreholes, however, it should be noted that groundwater levels will fluctuate with seasonal changes in precipitation.

2.1.5 Bedrock

Based on WSP's knowledge of the local geology, it was anticipated bedrock would be found on the outer edge of the current parking lot areas. Based on DPT15-3 and DPT15-4, bedrock was confirmed to be approximately 350 mm to 600 mm below grade in the area being considered for future expansion.

3. Geotechnical Design Recommendations

For the purpose of this project it is assumed that some excavations for light standards will be no greater than 1.5 m deep. The sand soils encountered at this depth shall be classified as Type 3 soils in accordance with the Occupational Health and Safety Act (OHSA). Type 3 soils must be excavated with an excavation sidewall of 1V:1H from the excavation bottom. Excavations should be protected from exposure to precipitation and associated ground surface runoff and should be inspected regularly for signs of instability.

3.1 Parking Lot Construction

It is recommended that all deleterious materials such as organic topsoil and soft saturated materials be removed within the footprint of the proposed parking lot upgrades to the proposed subgrade level extending 2 m on all sides. At this level the subgrade should consist of either a compact sand or gravelly sand fill. Prior to placement of granular materials the subgrade should be proof-rolled using a vibratory compactor with a nominal weight of 10 tonnes and inspected by qualified personnel to determine the suitability of the subgrade for the proposed loading. If loose or soft subsoils are identified during the proof roll, they are to be removed and replaced with a material consistent with the subgrade, or otherwise approved by a qualified engineer.

3.2 Dewatering

Based on the encountered subsurface material, groundwater conditions and dewatering should be significantly less than 50,000 L/day. Based on these conditions and anticipation that the excavations would not extend any deeper than 2.0 m below the existing asphalt running surface, dewatering of the sand should be manageable with sumps and filtered pumps. Depending on seasonal conditions, precipitation and other events such as the environmental spring thaw the inferred groundwater level may rise. Due to the high hydraulic conductivity of the material the areas should drain relatively quickly as such groundwater levels do rise. As such, a Permit to Take Water (PTTW) is not required for the proposed improvements of the parking lot.

3.3 Stormwater Management

It is understood that infiltration trenches may be considered for stormwater management. The test pit data indicates the sand materials anticipated at the trench bases have a hydraulic conductivity in the order of 10^{-4} m/s and estimated T-Time of approximately 2.0 min/cm. These conditions should be utilized for infiltration based stormwater management design.

All subgrades should be graded a minimum of 3 % to promote runoff away from the parking areas toward proposed stomwater conveyance structures. The surfaces of access roads and parking areas should be graded to a minimum of 2% to promote runoff to designated surface drainage features. Furthermore, final asphalt profile should match proposed grade elevations and maintain positive drainage away from structures and parking areas (if any).

3.4 Pavement Structure

The design detailed below in Table 1 will be suitable for proposed access roads and parking areas. We have included a heavy and light duty pavement structure, if regular or oversized vehicles are utilized in the parking area. Considerations should be made for the use of the heavy duty pavement. Due to the limited size of the site, and depending on an overall use, it may be prudent from a constructability point of view to install only the heavy duty structure. The following table outlines minimum granular and pavement requirements.

Table 1: Summary of Minimum Pavement Structures

	Subbase Requirement	Base Requirements	Pavement Requirements
Heavy Duty Pavement	450 mm OPSS Granular B Type 1 or Type 2 Compacted to 98% of SPMDD	150 mm OPSS Granular A Compacted to 98% of SPMDD	50 mm OPSS HL4 Surface Course Compacted to 92.5 % to 97.5 % MRD 50 mm OPSS HL8 Base Course Compacted to 92.5 % to 97.5 % MRD
Light Duty Pavement	200 mm OPSS Granular B Type 1 or Type 2 Compacted to 98% of SPMDD	150 mm OPSS Granular A Compacted to 98% SPMDD	65 mm OPSS HL4 Compacted to 92.5 % to 97.5 % MRD

Subgrade conditions are critical to the long-term performance of the asphalt surface and the subgrade should be prepared in accordance with recommendations elsewhere in this document.

The thickness of the granular base material could be increased at the discretion of the Engineer, or granular sub-base layers could be added, to accommodate site conditions at the time of construction. The existing granular fills on site are not suitable for the proposed base or subbase construction since they contain greater than 8% of silt size particles (<0.075 mm). The material should be disposed of appropriately or placed and compacted beneath an approved granular material as outlined above.

4. Limitations

The data, conclusions and recommendations which are presented in this geotechnical report, and the quality thereof, are based on a scope of work authorized by the Client. While we believe the borehole, test pit and dynamic bar probe information to be representative of site conditions, subsurface conditions between and beyond the investigated locations may vary. If significant differences in the subsurface conditions

described above are found, we should be contacted immediately to revise our findings and recommendations, if necessary.

The design recommendations provided in this report are intended for Designers and should not be construed as providing instructions to Contractors, who should form their own opinions about site conditions for tending, construction procedures and general planning. WSP Canada Inc. accepts no liability for use of or reliance on the report information by third parties, without express written consent.

We trust this report is acceptable. Please contact us if you have any questions.

Yours truly,
WSP Canada Inc.

Arash Yazdani, P.Eng.
Geotechnical Engineer

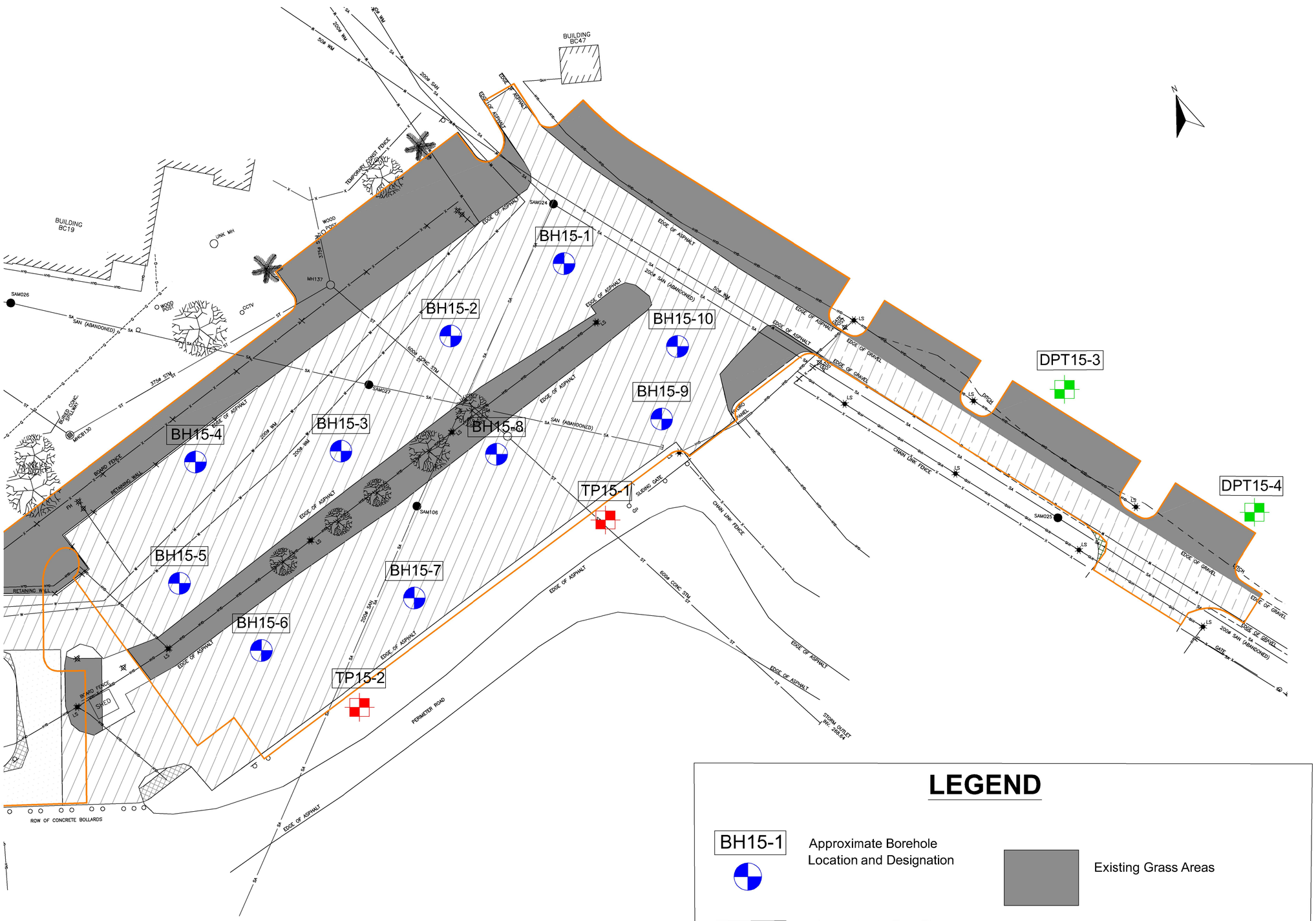
Reviewed by:

Steve Clark, M.Sc., P.Eng.
Senior Project Engineer

Figures

04 11

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



0 10 20

LEGEND

BH15-1	Approximate Borehole Location and Designation		Existing Grass Areas
TP15-1	Approximate Test Pit Location and Designation		Existing Parking Area and Roadway
DPT15-1	Approximate Dynamic Test Probe Location and Designation		Proposed Parking Area Outer Boundary

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP
294 RINK STREET, SUITE 103
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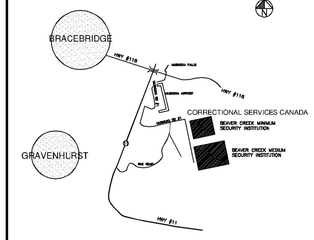
WWW.WSPGROUP.COM

LOCATION SKETCH
N.T.S.



BENCHMARK:
1) BRASS BM LOCATED AT NE CORNER OF MOTORCYCLE PARKING PAD. ELEV: 198.52m

revision		date
04		
03		
02		
01		

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
GRAVENHURST Ontario
BEAVER CREEK INSTITUTION

SITE DEVELOPMENT AND PARKING EXPANSION

drawing title / titre du dessin
BOREHOLE LOCATION PLAN

drawn by / dessine par: DPS/ML/IAA

designed by / conc par: AT/DPS

approved by / approuve par: AY

tender / soumission — project manager / administrateur de projets

project date / date du projet: 17/12/2015

project no. / no. du projet: 141-14303-00

drawing no. / dessine no.: FIGURE 1

GSC-A1 DATE PLOTTED: 03/09/2016 PLOT SCALE: 1:300 CAD FILE:

Appendix A

BOREHOLE EXPLANATION FORMS, BOREHOLE LOGS

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Silt & Clay	< 0.075 mm	"trace" (e.g. trace sand)	<10%
Sand	0.075 to 4.75 mm	"some" (e.g. some sand)	10% - 20%
Gravel	4.75 to 75 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	75 to 300 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>300 mm	noun (e.g. sand)	>50%

* Extension of USCS Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

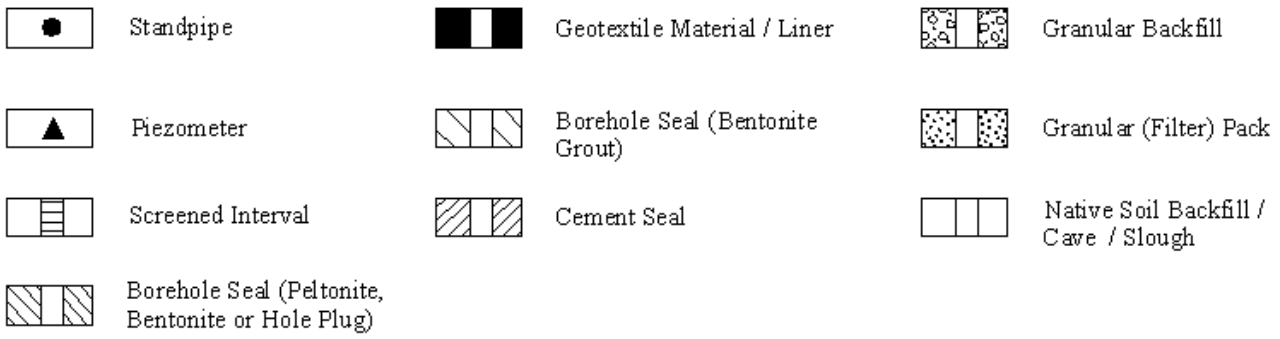
COHESIONLESS SOILS	COHESIVE SOILS		
Dry	DTPL	-	Drier Than Plastic Limit
Moist	APL	-	About Plastic Limit
Wet	WTPL	-	Wetter Than Plastic Limit
Saturated	MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.



Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS	=	Split Spoon	GS	=	Grab Sample
ST	=	Thin Walled Shelby Tube	CS	=	Channel Sample
AS	=	Auger Flight Sample	WS	=	Wash Sample
CC	=	Continuous Core	RC	=	Rock Core

$$\text{\% Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

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

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60º steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{xBlows}{mm}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BOREHOLE NO. BH15-1

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 273.4 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH 50 100 150 200 (Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 50mm:										
	GRANULAR FILL: GREY GRAVELLY SAND, SOME SILT, MOIST			AS1							GSA AS1: Gravel: 27% Sand: 63% Silt & Clay: 10%
				AS2							
0.9	SAND: BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST										BOREHOLE DRY UPON COMPLETION, CAVED TO 0.9mBGL
1.0				AS3							
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-2

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 273.5 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH 50 100 150 200 Intact (MaX) Cu - Remoulded Cu	WATER CONTENT % 10 20 30 W_P W_L	REMARKS
0.0	ASPHALT - 50mm :										
0.1	GRANULAR FILL: GREY GRAVELLY SAND, TRACE TO SOME SILT, MOIST			AS1							
				AS2							
0.9	SAND: LIGHT BROWN SAND, TRACE SILT, TRACE GRAVEL, MOIST										
1.0				AS3							GSA AS3: Gravel: 1% Sand: 96% Silt & Clay: 3% BOREHOLE CAVED TO 1.2 mBGL AND DRY UPON COMPLETION OF DRILLING
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-3

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 273.4 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION / "N" VALUE (10 20 30) / SHEAR STRENGTH (50 100 150 200; Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % (10 20 30; W_P W_L)	REMARKS
0.0	ASPHALT - 50mm:										
0.1	GRANULAR FILL: GREY SAND AND GRAVEL, SOME SILT, MOIST			AS1							
				AS2							GSA AS2: Gravel: 34% Sand: 49% Silt & Clay: 17%
0.6	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST										
1.0				AS3							BOREHOLE CAVED TO 1.2 mBGL AND DRY UPON COMPLETION OF DRILLING
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-4

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 273.5 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION / "N" VALUE (10 20 30) / SHEAR STRENGTH (50 100 150 200; Intact (MaX) Cu; Remoulded Cu)	WATER CONTENT % (10 20 30; W_P – W_L)	REMARKS
0.0	ASPHALT - 76mm:										
0.1	GRANULAR FILL: BROWN-GREY GRAVELLY SAND, SOME SILT, MOIST			AS1							GSA AS1: Gravel: 33% Sand: 53% Silt & Clay: 14%
				AS2							
0.7	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST										
1.0				AS3							BOREHOLE CAVED TO 1.2 mBGL AND DRY UPON COMPLETION OF DRILLING
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-5

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 273.4 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION / "N" VALUE (10 20 30) / SHEAR STRENGTH (50 100 150 200; Intact (MaX) Cu; Remoulded Cu)	WATER CONTENT % (10 20 30; W_P W_L)	REMARKS
0.0	ASPHALT - 76mm:										
0.1	GRANULAR FILL: GREY GRAVELLY SAND, SOME SILT, MOIST			AS1							
				AS2							
0.8	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST TO WET										
1.0				AS3							BOREHOLE CAVED TO 1.2 mBGL AND DRY UPON COMPLETION OF DRILLING
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-6

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 272.8 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION / "N" VALUE (10 20 30) / SHEAR STRENGTH (50 100 150 200; Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % (10 20 30; W_P W_L)	REMARKS
0.0	ASPHALT - 51mm:										
0.1	GRANULAR FILL: GREY GRAVELLY SAND, SOME SILT, MOIST			AS1							GSA GS1: Gravel: 29% Sand: 55% Silt & Clay: 16%
				AS2							
0.7	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST TO WET										
1.0				AS3							BOREHOLE CAVED TO 1.2 mBGL AND DRY UPON COMPLETION OF DRILLING
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-7

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 272.8 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH 50 100 150 200 (Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0.0											
0.1	ASPHALT - 50 mm:										
	GRANULAR FILL: GREY GRAVELLY SAND, SOME SILT, MOIST			AS1							
				AS2							
0.8	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST TO WET										
1.0				AS3							BOREHOLE CAVED TO 1.0 mBGL AND DRY UPON COMPLETION OF DRILLING GSA GS3 Gravel: 3% Sand: 93% Silt & Clay: 4%
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-8

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 272.9 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION / "N" VALUE (10 20 30) / SHEAR STRENGTH (50 100 150 200; Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % (10 20 30; W_P – W_L)	REMARKS
0.0	ASPHALT - 175mm :										
0.1	GRANULAR FILL: LIGHT BROWN SAND AND GRAVEL, SOME SILT, MOIST, COMPACT TO DENSE			AS1							GSA GS1: Gravel: 36% Sand: 50% Silt & Clay: 14%
				AS2							
0.6	SAND: ORANGE BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST										
1.0											BOREHOLE CAVED TO 0.9 mBGL AND DRY UPON COMPLETION OF DRILLING
				AS3							
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW GROUND SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-9

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 272.7 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION / "N" VALUE (10 20 30) / SHEAR STRENGTH (50 100 150 200; Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % (10 20 30; W_P W_L)	REMARKS
0.0	ASPHALT - 63mm:										
0.1	GRANULAR A FILL: GREY GRAVELLY SAND, SOME SILT, MOIST			AS1							
0.8	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST TO WET			AS2							BOREHOLE CAVED TO 0.9 mBGL AND DRY UPON COMPLETION OF DRILLING
1.0											
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW SURFACE IN SAND.										
2.0											
3.0											

BOREHOLE NO. BH15-10

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: 168 mm SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 272.8 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION / "N" VALUE (10 20 30) / SHEAR STRENGTH (50 100 150 200; Intact (MaX) Cu; Remoulded Cu)	WATER CONTENT % (10 20 30; W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 50mm										
	GRANULAR FILL: GREY GRAVELLY SAND, SOME SILT, MOIST			AS1							
				AS2							
0.9	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST										BOREHOLE CAVED TO 1.0 mBGL AND DRY UPON COMPLETION OF DRILLING
1.0											
				AS3							
1.5	BOREHOLE TERMINATED AT 1.5 m BELOW SURFACE IN SAND.										
2.0											
3.0											

TEST PIT NO. TP15-1

PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 272.1 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH 50 100 150 200 (Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0.0	TOPSOIL: GREY-BROWN SAND, SOME SILT, TRACE GRAVEL, ORGANICS PRESENT, MOIST			GS1							
0.2	SAND: ORANGE BROWN SAND, SOME SILT, MOIST			GS2							
0.3	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST			GS3							
	- GREY, WET			GS4							
1.0											
1.1	TEST PIT TERMINATED AT 1.1m BELOW SURFACE IN SAND										- INFERRED T-TIME OF 2.0 min/cm TEST PIT OPEN AND DRY UPON COMPLETION
2.0											
3.0											

TEST PIT NO. TP15-2

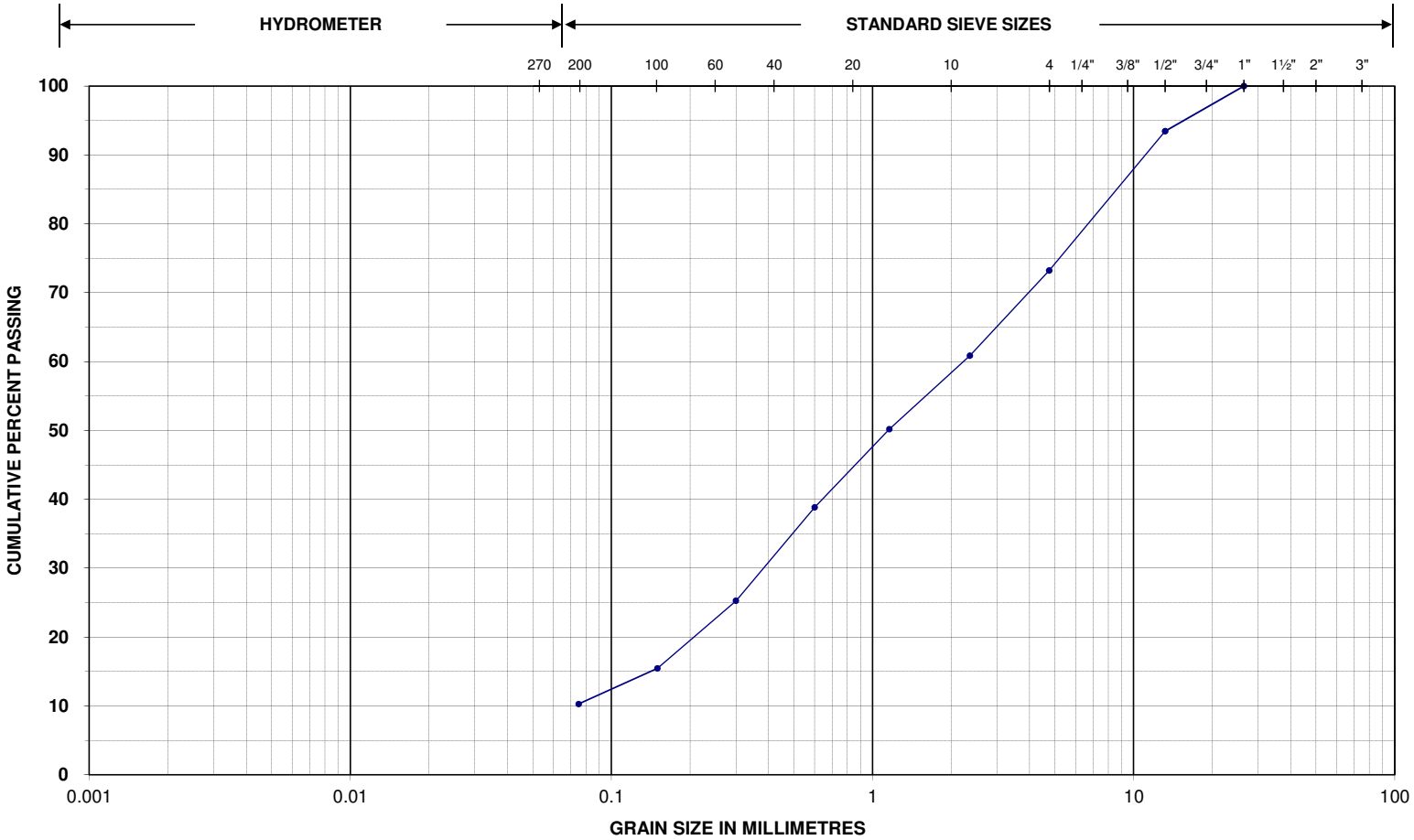
PROJECT NAME: BEAVER CREEK INSTITUTION
PROJECT NO.: 141-14303-09
CLIENT: PWGSC
DATE COMPLETED: Dec 17, 2015
BOREHOLE TYPE: SOLID STEM AUGER
SUPERVISOR: IAA
GROUND ELEVATION: 272.5 mASL (Estimated from DEM)
REVIEWER: AY

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE CGD (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH 50 100 150 200 (Intact (MaX) Cu, Remoulded Cu)	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0	TOPSOIL: GREY-BROWN SILTY SAND, TRACE GRAVEL, ORGANICS PRESENT, MOIST			GS1							
0.2	SAND: RED- BROWN SAND, SOME SILT, MOIST			GS2							
0.5	SAND: LIGHT BROWN SAND, TRACE GRAVEL, TRACE SILT, MOIST			GS3							
	- GREY			GS4							
1.0											- INFERRED T-TIME OF 2.0 min/cm
1.1	TEST PIT TERMINATED AT 1.1m BELOW SURFACE IN SAND										TEST PIT OPEN AND DRY UPON COMPLETION
2.0											
3.0											

Appendix B

GEOTECHNICAL LABORATORY TEST RESULTS

PARTICLE SIZE DISTRIBUTION



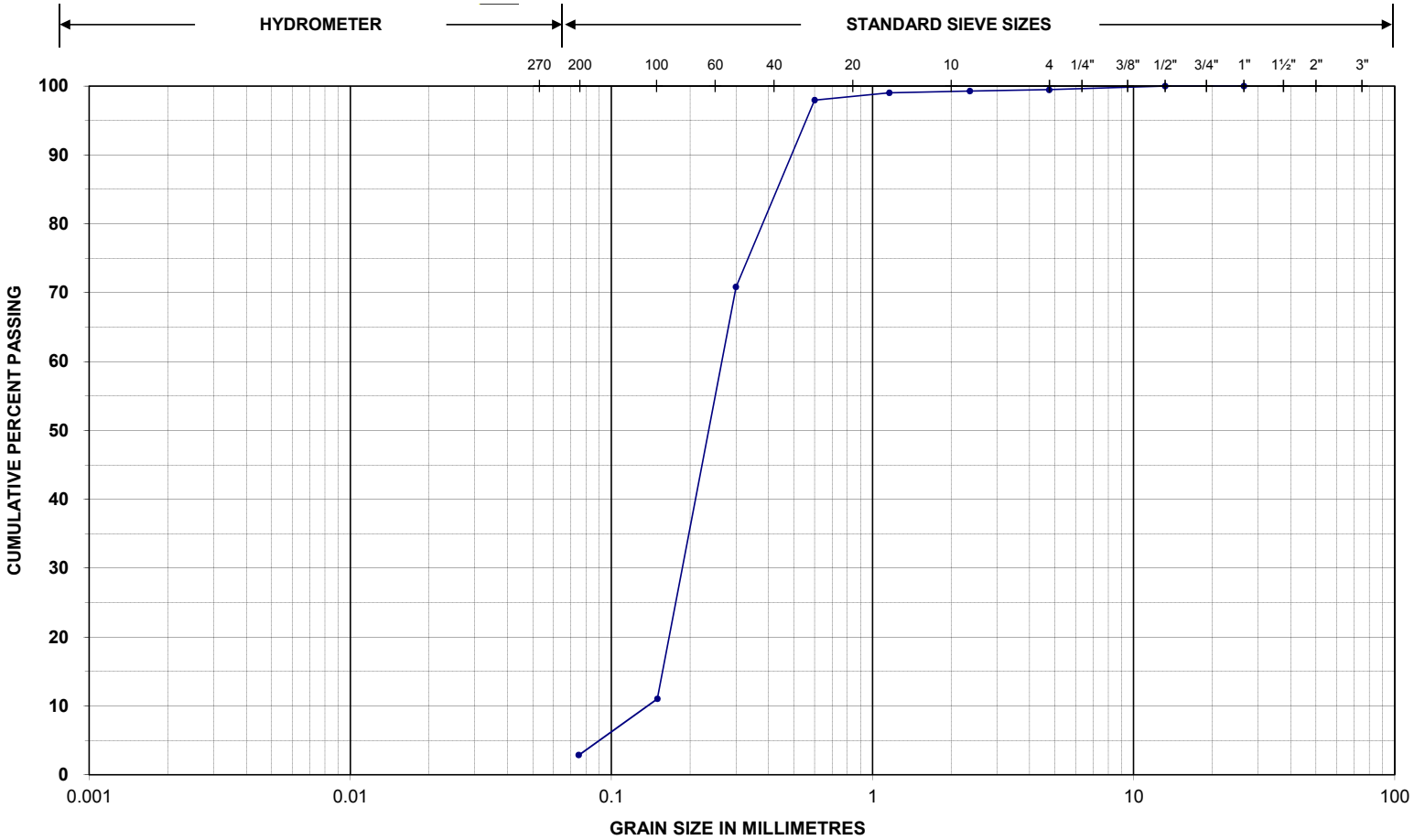
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Beaver Creek Institution	**Project No.:**	141-14303-09
Location ID.:	BH15-1	**Sample No./Depth:**	GS1 / 0.05-0.1m

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine
37.5 mm	100.0	**1.16 mm**	50.2
26.5 mm	100.0	**0.60 mm**	38.8
13.2 mm	93.4	**0.30 mm**	25.3
4.75 mm	73.2	**0.15 mm**	15.5
2.36 mm	60.8	**0.075 mm**	10.3

PARTICLE SIZE DISTRIBUTION



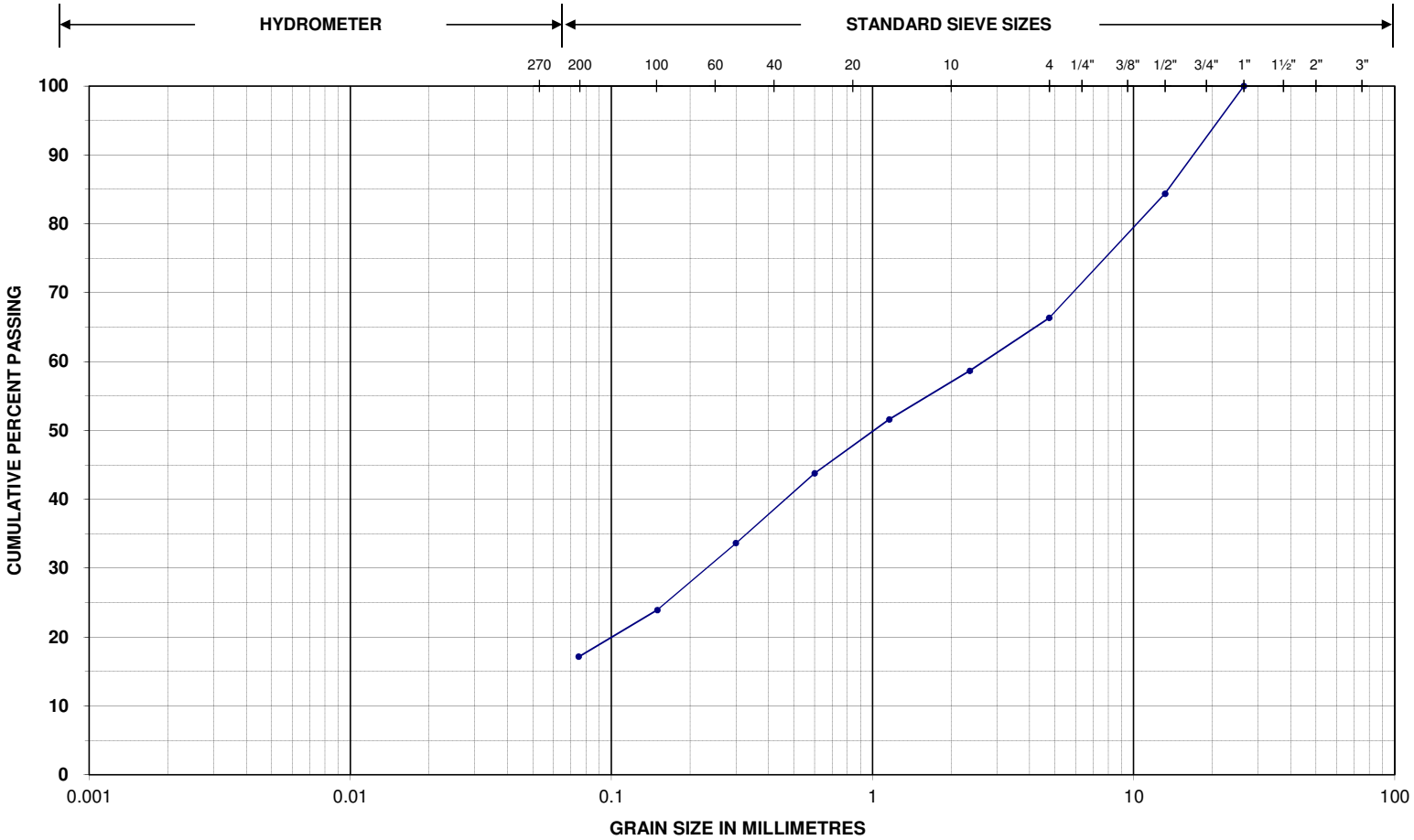
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Beaver Creek Institution	**Project No.:**	141-14303-09
Location ID.:	BH15-2	**Sample No./Depth:**	GS3 / 0.9-1.5m

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine
37.5 mm	100.0	**1.16 mm**	99.0
26.5 mm	100.0	**0.60 mm**	98.0
13.2 mm	100.0	**0.30 mm**	70.8
4.75 mm	99.5	**0.15 mm**	11.0
2.36 mm	99.3	**0.075 mm**	2.9

PARTICLE SIZE DISTRIBUTION



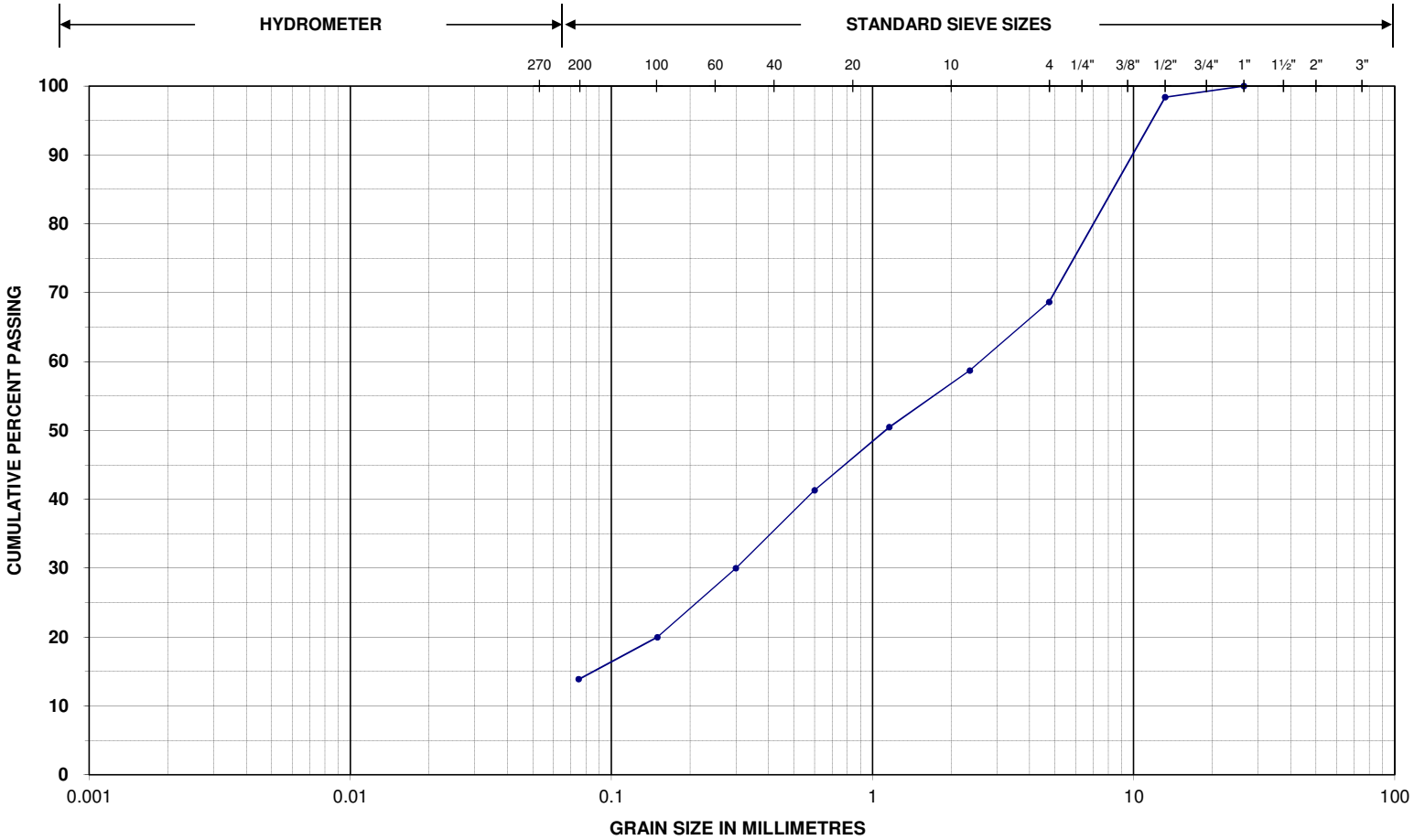
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Beaver Creek Institution	**Project No.:**	141-14303-09
Location ID.:	BH15-3	**Sample No./Depth:**	GS2 / 0.2-0.9m

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine
37.5 mm	100.0	**1.16 mm**	51.6
26.5 mm	100.0	**0.60 mm**	43.8
13.2 mm	84.4	**0.30 mm**	33.6
4.75 mm	66.3	**0.15 mm**	23.9
2.36 mm	58.6	**0.075 mm**	17.1

PARTICLE SIZE DISTRIBUTION



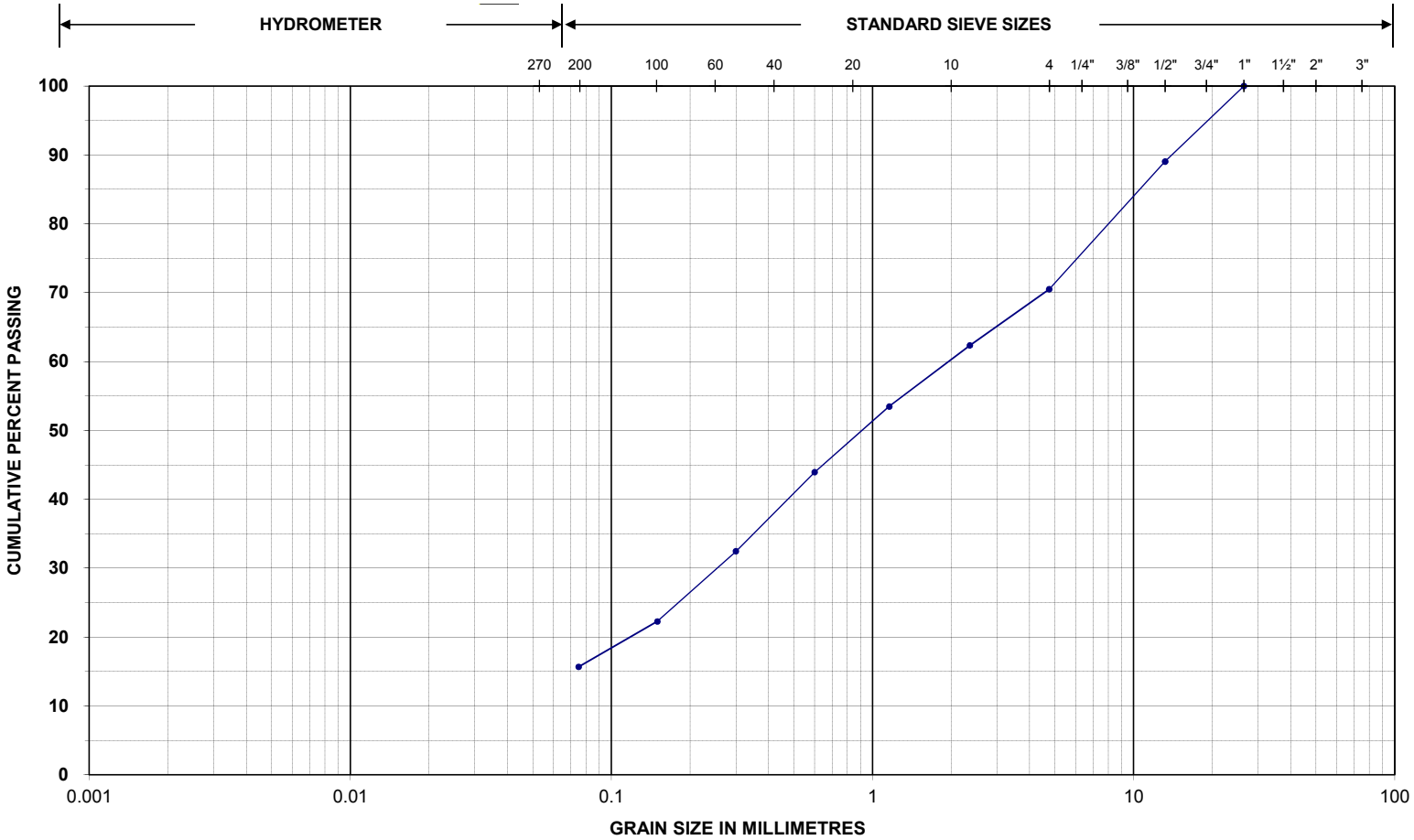
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Beaver Creek Institution	**Project No.:**	141-14303-09
Location ID.:	BH15-4	**Sample No./Depth:**	GS1 / 0.08-0.25m

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine
37.5 mm	100.0	**1.16 mm**	50.5
26.5 mm	100.0	**0.60 mm**	41.3
13.2 mm	98.4	**0.30 mm**	30.0
4.75 mm	68.6	**0.15 mm**	20.0
2.36 mm	58.7	**0.075 mm**	13.9

PARTICLE SIZE DISTRIBUTION



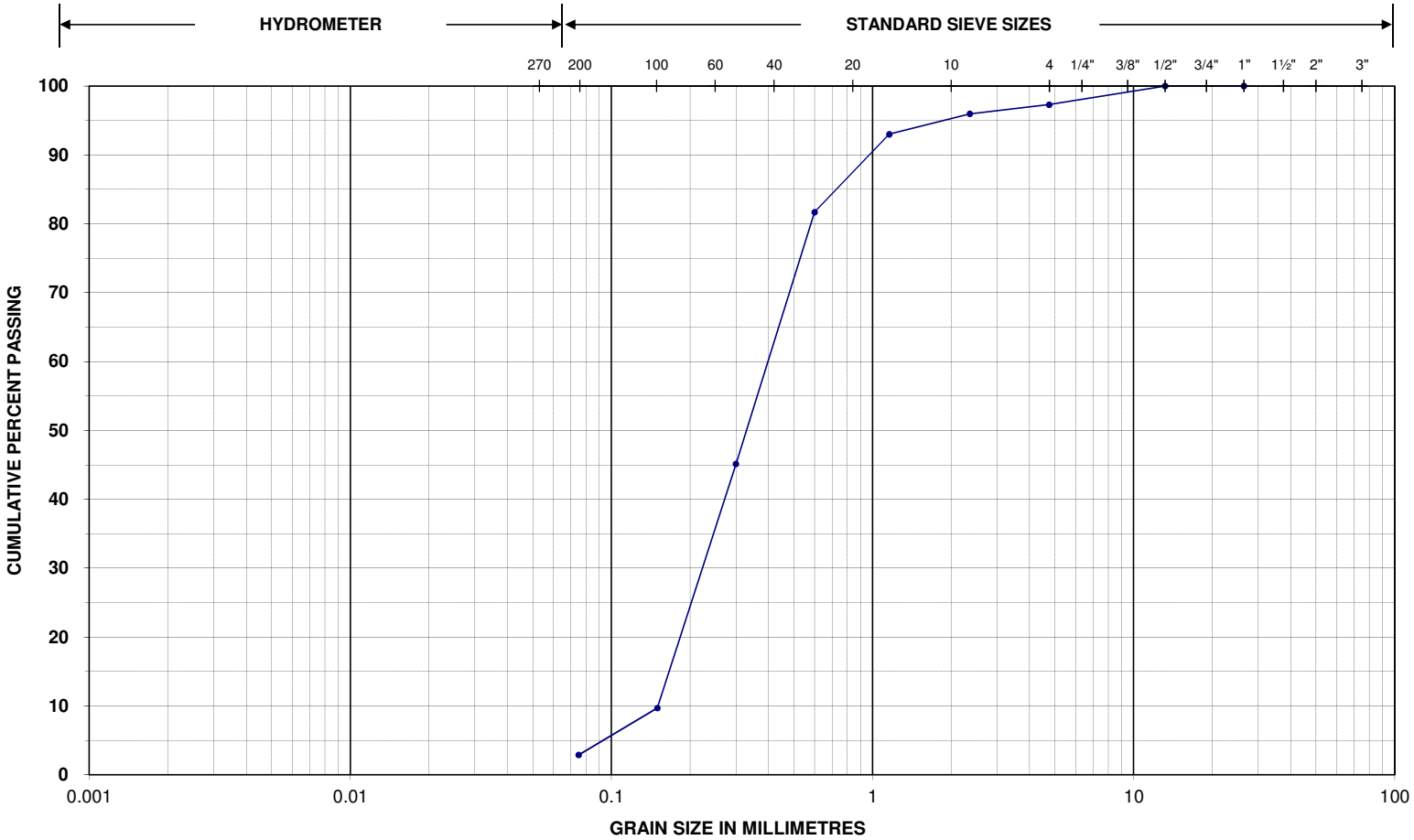
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Beaver Creek Institution	**Project No.:**	141-14303-09
Location ID.:	BH15-6	**Sample No./Depth:**	GS1 / 0.05-0.2m

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine
37.5 mm	100.0	**1.16 mm**	53.5
26.5 mm	100.0	**0.60 mm**	43.9
13.2 mm	89.0	**0.30 mm**	32.4
4.75 mm	70.5	**0.15 mm**	22.3
2.36 mm	62.3	**0.075 mm**	15.7

PARTICLE SIZE DISTRIBUTION



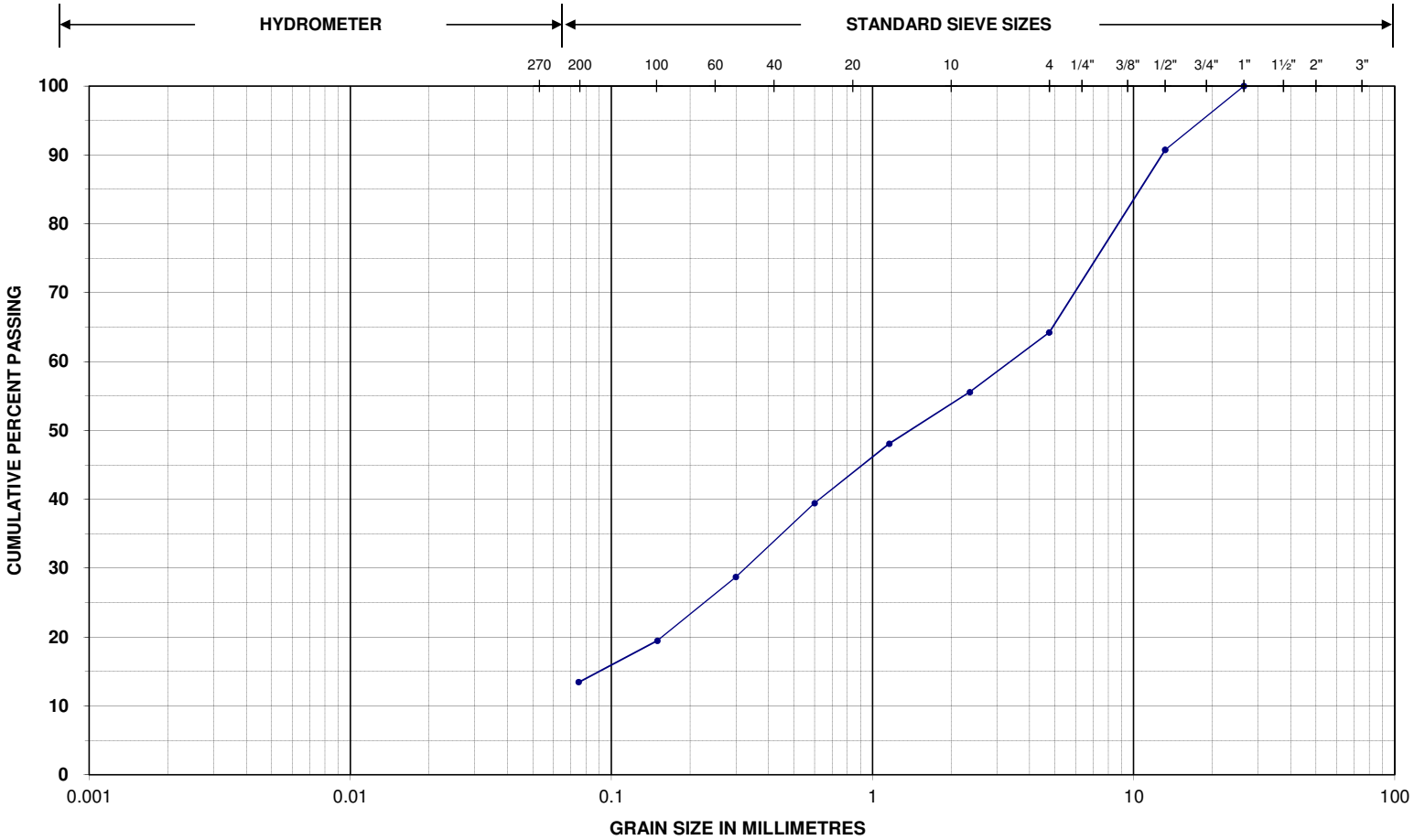
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Beaver Creek Institution	**Project No.:**	141-14303-09
Location ID.:	BH15-7	**Sample No./Depth:**	GS3 / 0.8-1.5m

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine
37.5 mm	100.0	**1.16 mm**	93.0
26.5 mm	100.0	**0.60 mm**	81.7
13.2 mm	100.0	**0.30 mm**	45.1
4.75 mm	97.3	**0.15 mm**	9.7
2.36 mm	96.0	**0.075 mm**	2.9

PARTICLE SIZE DISTRIBUTION



Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Beaver Creek Institution	**Project No.:**	141-14303-09
Location ID.:	BH15-8	**Sample No./Depth:**	GS1 / 0.08-0.2m

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine
37.5 mm	100.0	**1.16 mm**	48.1
26.5 mm	100.0	**0.60 mm**	39.4
13.2 mm	90.7	**0.30 mm**	28.7
4.75 mm	64.2	**0.15 mm**	19.5
2.36 mm	55.6	**0.075 mm**	13.5

ANNEX B

ENVIRONMENTAL EFFECTS EVALUATION (EEE) REPORT

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Canada

Respect ◆ Integrity ◆ Excellence ◆ Leadership

Serving GOVERNMENT, Serving CANADIANS.

Environmental Effects Evaluation (EEE) Report

Correctional Services Canada
Beaver Creek Institution
Site Development and Parking Lot Expansion

PWGSC Project No. R.079593.001

Prepared by
Public Works and Government Services Canada –
Environmental Services and Contaminated Sites Directorate
Ontario Region

June 2016

TABLE OF CONTENTS

LIST OF APPENDICES

PART A: PROJECT INFORMATION

Project Title:	*Site Development and Parking Lot Expansion, Beaver Creek Institution*
Project Location:	**Gravenhurst, Ontario**
Project Description:	Expand and reconfigure existing parking lots and improve existing roadway infrastructure.
Federal Department:	**Correctional Services Canada (CSC)**
CSC Contact:	**Peter Ibrayev** Project Leader Correctional Service Canada 340 Laurier Avenue West Ottawa, Ontario K1A 0P9 Peter.Ibrayev@csc-scc.gc.ca Phone: 613-996-8031
PWGSC Contact:	**Assad Ghubril** Senior Project Manager Real Property Services PWGSC - Ontario Region 4900 Yonge Street, Toronto, Ontario Assad.Ghubril@pwgsc-tpsgc.ca Phone: 416-590-5766
EEE Assessor contact:	**Lee Chan** Environmental Specialist PWGSC - Ontario Region 4900 Yonge St., 11th Floor Toronto, ON M2N 6A6 Lee.Chan@pwgsc-tpsgc.gc.ca Phone: 416-512-5948
PWGSC Project Number:	**R.079593.001**

PART B: SCOPE OF PROJECT

Project Description

Correctional Services Canada (CSC) has retained Public Works and Government Services Canada (PWGSC) to prepare an Environmental Effects Evaluation (EEE) Report for the proposed Site Development and Parking Expansion at the Beaver Creek Correctional Institution, Ontario. PWGSC is managing the project on behalf of CSC.

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.

Within the context of the *Canadian Environmental Assessment Act* (CEAA) 2012 legislation, the CSC Site Development and Parking Expansion 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.

Correctional Services Canada is proposing to expand and reconfigure existing parking lots and improve the existing roadway infrastructure located within the Beaver Creek Institution. Beaver Creek Institution is a minimum-security correctional facility operated by CSC located on a shared property within the Town of Gravenhurst, Ontario, on Lot 3 Concession 6 within the District Municipality of Muskoka. This property is located 7 kilometres (km) northeast of Gravenhurst, Ontario on Beaver Creek Drive which is 2 km to the east of Highway 11. The site is bordered by Beaver Creek Drive and the Muskoka Airport to the north, privately and municipally owned lands to the west, and the Beaver Creek waterway to the east and south. Beaver Creek Institution shares the property with Fenbrook Institution a medium-security correctional facility located immediately south. The property on which both institutions are located is 132 hectares (ha) in size and is owned by the Government of Canada.

With the completion of several new buildings and units to the property, the demand for on-site parking has also increased. The capacity of the institutions are collectively being increased to accommodate approximately from 520 to 620 inmates at Fenbrook Institution and from 250 to 300 inmates Beaver Creek Institution.

This project will involve the removal of existing vegetation and infrastructure within the expansion areas (such as outcrops, curbs and landscaped islands). Upon completion, the landscaping will be restored and the catch basins and storm sewers will be reinstated to ensure adequate storm water management for the expanded parking lot. Existing roadwork is planned to be improved on essentially the same footprint. No roads are being reoriented nor are being constructed.

Improvements to the parking lots involve expansion of existing lots to accommodate additional parking spaces. The improvements will result in two of the three existing parking lots, Lot D2 and D3, providing a total of 71 new parking spaces. Of this total, Lot D2 will be reconfigured to provide an additional 27 spaces and Lot D3 will house the additional 44 of the 71 new spaces. The improvements involve the removal of existing asphalt, concrete islands and removal of trees from the islands. New layer of granular materials will be applied and new asphalt will be applied on top. New light standards will be installed as well as new islands and plants. See also Table 1 (Project Scope).

Figure 1

Aerial View of Beaver Creek Institution (on the north) and Fenbrook Institution (on the south).
(Source: GoogleMaps, 2014)

Prior to commencing construction activities or delivery of materials to site, the Contractor(s) will submit an Environmental Protection Plan. The Environmental Protection Plan will present a comprehensive overview of known or potential environmental issues and how they will be mitigated during construction. Topics will be addressed at a level of detail commensurate with environmental issues and required construction tasks.

During construction the Contractor(s) will be responsible for the safe performance of the work and the safety of all persons engaged in the work.

See Appendix A for Figures, Drawings and Photos.

Table 1: Project Scope

Project Phase	Project Components	
	Core Project Components	**Ancillary Works Other Projects & Activities**
Site Preparation	Remove existing obstructing infrastructure in Lot D (such as curbs, signs and landscaped islands) from within Lot D. Clear obstructing rock outcrop of the proposed expansion area of Lot D. Clear vegetation and infrastructure, as applicable, undertake grubbing and grade the area of the proposed expansion area of Lot D. Removal of existing asphalt and underlying granular base of Lot D.	Establish temporary routes for pedestrian and vehicular traffic to avoid the worksite, if necessary. Remove and relocate signage. Construct and maintain temporary "access to" and "egress from" work areas. Establish location and extent of service lines in area of work before starting work. Where required, remove existing infrastructure (catch basins, manhole, storm drains, sanitary sewer) and cap or set aside for reinstatement following parking lot installation. Protect existing pavement not designated for removal, light units and structures and vegetation from damage. Installation of temporary sediment and erosion control measures as required.
Parking Lot Expansion and Reconfiguration	Install asphalt parking areas (placement of sub-base and granular to design grades, paving to design grades, pavement markings) of Lot D. Install infrastructure and landscape features according to reconfiguration layout. Install New Concrete Walkways, Bollards, Curbs and Gutters.	Install storm utility drains, swales and ditches. Re-grade existing ditch. Reinstate light posts and other infrastructure within the footprint of the parking lot (catch basins, manhole, and storm pipes). Undertake permanent parking lot painting.
Landscaping	Restore existing and install new landscaping features affected by construction.	Topsoil and seed areas where appropriate. Sodding and mulching of landscaped islands and lot perimeters where appropriate.
Operation	Operation of expanded parking lots to be the same as previous operation.	

B.2 Scheduling

Construction is expected to begin in approximately early July 2016 and estimated to be completed by late November 2016.

PART C: SCOPE OF EVALUATION

Environmental Setting

Information in this section has been compiled from previous studies undertaken at Beaver Creek Institution as well as the adjacent Fenbrook Institution including:

- *Site Development and Parking Expansion Study: Summary Report and Recommendations* (CIMA, 2014) which includes the *Site Development and Parking Expansion Study: Existing Conditions Report* (CIMA, 2014).
- *New Firing Range – Fenbrook Institution Gravenhurst, Ontario (Environmental Assessment)* (PWGSC, 2012).
- *Phase 1 Environmental Site Assessment, Fenbrook Institution Volume 1 / 4, Correctional Services Canada* (SNC Lavalin Engineers & Constructors, 1999).

The Beaver Creek Institution is located on a 132 ha sized property shared with Fenbrook Institution in Gravenhurst, Ontario. Although CSC recently classified both institutions as Beaver Creek, this report will refer to Fenbrook and Beaver Creek Institutions in unison with the previous studies. Beaver Creek institution (for minimum security male offenders) opened in 1961 and is rated to accommodate 201 inmates and Fenbrook institution (for medium security male offenders) opened in 1998 and is rated to accommodate 420 inmates[1].

Both institutions are established in a natural landscape typical of the Muskoka area where mature white pine, oak, maple and spruce trees are present throughout the site. In addition to the trees and buildings, the site is comprised of asphalt and manicured lawns with some shrubs ornamentally-placed around the Duty Office and Administration Building. Designated walkways are located within the Beaver Creek inmate housing area as well at the Duty Office and Administration Building.

The area within which the proposed works are planned consists of mostly paved areas with some vegetated areas comprised of both native and non-native species. Buildings of both Beaver Creek and Fenbrook Institutions are located north and south of the area respectively.

Access to the property is by paved road that transverses north and south between Highway 11 and the Muskoka Municipal Airport. The access road connects to other paved roads that encircle both institutions as well as parking lots associated with the property. The property is bounded by the Muskoka Municipal Airport to the north, undeveloped lands to the east, south and west. A firing range is located just east of Fenbrook Institution (on a former septic tile bed).

Biophysical Environment

Physiography

Physiography is the description of the land surface as controlled by the underlying bedrock and

[1] http://www.csc-scc.gc.ca/institutions/001002-3002-eng.shtml

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 physiographic regions of southern Ontario were defined by L. J. Chapman and D.F. Putnam in 1966.[2]

The institutions are located within the Great Lakes – St. Lawrence Forest Region and are mostly under natural forest cover. The area is comprised of a very diverse landscape. The wide range of physical features including wetlands, forests, ridges and grasslands enriches the rural character of the landscape. The property is located along the boundaries of these physiographic regions: the Algonquin Highlands (to the north and east), and the Georgian Bay Fringe (beneath the site to the south and west).[3]

The municipality of Gravenhurst is situated in the Grenville Province of the Canadian Shield. The bedrock is comprised primarily of high-grade, mafic-rich gneisses, and gneissic diorites, granites and gabbros.[4] Sand and silty surficial soils overlay this highly metamorphosed parent material.

The property slopes gently from the northwest to the southeast towards Beaver Creek which transverses to the east of the property from the north to south-southwest and just adjacent to the new firing range and former sewage lagoons. The topography is variable, with numerous rock outcroppings, lowland and wetland areas. The northeast corner of the fenced area of Fenbrook Institution has a depression containing a fen (a treed area west of the new firing range). A nature trail extends through the southwest corner of the CSC property, which is wooded and has numerous rock outcrops.

Sandy deposits cover the majority of the property with boggy areas and bedrock covering the remainder of the undeveloped land. Clayey deposits occur in the vicinity of the boggy areas and in the vicinity of the sewage lagoon. Bedrock outcrops are visible in the southeast and northwest portions of the property. A ridge of bedrock is exposed on the east side of Beaver Creek.

The former septic tile bed provides a generally flat topography. On the southern and western edges of the former septic tile bed, the property slopes towards existing drainage ditches.

Hydrology

The Canadian Shield characterizes hydrogeological aspects on the available groundwater quantity, quality and sensitivity. The fractured granite bedrock characterizes one of the two identified aquifer systems. This bedrock aquifer is used regionally to supply domestic water needs. A second unconfined surficial overburden aquifer supplies water for landscaping purposes on site.[5]

Recharge (replenishment of water to an aquifer) to the groundwater systems is gradual. The abundance of sand in the overlying material facilitates drainage, discouraging percolation into the underlying aquifer systems. Although the underlying granite bedrock is generally impermeable, the presence of fractures, exposed bedrock outcrops and thin overlying soils create potential sources of contamination.

Terrain and Topography

Topography of the site on a larger scale slopes gently from the northwest to the southeast towards

[2] Chapman and Putnam. 1966. The Physiography of Southern Ontario.
[3] SNC-Lavalin Inc. 2002. Enhanced Phase I Environmental Site Assessment.
[4] Geological Survey of Canada. 1982. Geology of the Gravenhurst Region, Grenville Structural Province, Ontario.

[5] SNC-Lavalin Inc. 2002. Enhanced Phase I Environmental Site Assessment.

Beaver Creek, which transects the property from north to south-west.[6] Glaciation sculpted the landscape, depositing a thin, discontinuous layer of sandy drift cover on the surficial terrain. The topography is comprised of numerous bedrock outcrops and wetlands. Bedrock outcrops are visible in various locations across the property, particularly a ridge of bedrock exposed on the east side of Beaver Creek, near where the proposed lot expansion is expected to occur.

The Beaver Creek and Fenbrook Institutions reside within the jurisdiction of Muskoka. The Muskoka watershed covers approximately 4,660 km^2 and is comprised of three sub-watersheds: the North Branch, South Branch and Lower Muskoka. The property is located in the Lower Muskoka sub-watershed, which makes up approximately one-third of the watershed. It receives inflow from both the North Branch and South Branch, where the combined outflow ultimately discharges into Georgian Bay.[7]

Waterbodies and Wetlands

The property is bisected by Beaver Creek which is a freshwater creek flowing north to south to the Hoc Roc River. The property is neighboured by several lakes. Reay Lake is located just southeast of the site, Paul's Lake northeast and Wright's Lake further north.[8] The property is situated on a former lake bed, evidenced by scattering patches of swamps, boggy areas and low wetland depressions.[9] The proximity of the site to hydrological features diverts the ecological dependence from the wetlands to the shorelines of the neighbouring water bodies.

Beaver Creek drains Wright's Lake (located approximately 2 km from area of proposed works), Paul's Lake (located approximately 1 km north of the area of proposed works), and Reay Lake (located approximately 1 km east of the area of proposed works). The Creek flows in a southerly and westerly direction towards Lake Muskoka (located approximately 6 km from the proposed work) through Hoc Roc River. The Creek is located approximately 300 m east of the proposed parking lot expansions. Planted and natural trees, an existing access road and a new firing range lie between the Creek and the area of proposed works.

The section of Beaver Creek that bisects the entire CSC property can be generally characterized as gently meandering with sections that are affected by beaver activity. The Beaver Creek watershed is characterized as a wide floodplain that is vegetated by a variety of herbaceous and woody species. The actual width of the watercourse, which ranges from less than 1 m to 6 m and depth, which is generally 1m and typically less than 2 m, is determined to much extent by beaver activity. Given the contribution of groundwater to the base flow, the water quality of Beaver Creek is considered generally good.

From observations by CIMA (2014), a pond lies east of Fenbrook Institution (approximately 200 metres south - southeast of the project area) and marshy areas lie just south of the pond and at the south east side of Fenbrook Institution.

Storm water management on the CSC property is provided by a combination of surface storm water ditches and underground storm sewers with associated catch basins. Beaver Creek Institution's storm water passes through the Fenbrook storm water management system prior to discharge into a

[6] SNC-Lavalin Inc. 2002. Enhanced Phase I Environmental Site Assessment.

[7] Muskoka Watershed Council. 2015. Muskoka River Watershed. (http://www.muskokawatershed.org/watersheds/muskoka-river-watershed/)

[8] Ontario Geological Survey. 1992. Quaternary Geology of the Gravenhurst area, Southern Ontario.

[9] CIMA. 2014. Beaver Creek and Fenbrook Institutions Site Development and Parking Expansion Study: Summary Report and Recommendations.

sediment basin east of the institution between the perimeter road and Beaver Creek. Overflow from the sediment basin discharges into Beaver Creek.

Fenbrook Institution also has two man-made channels which collect groundwater seepage. These channels converge near the perimeter fence, at which point seepage is also collected from the on-site fen. The channels have replaced a small ground-fed tributary which existed at the site prior to the development of the Fenbrook Institution. After convergence, the channel drains in a south-westerly direction through a rubble-lined, storm water management pond towards Beaver Creek.

Fenbrook Institution contains within its enclosure a fen in the northeastern corner (immediately west of the new firing range). It is considered to have regional significance. The fen is composed of a relatively sparse upper stratum of young balsam fir, red maple, yellow birch and black cherry; the relatively sparse shrub stratum consisting mainly of upper stratum saplings, meadowsweet, speckled adler, hobblebush, wild raisin and smooth blackberry; and the floor of the fen including peat moss, sedges and grasses.

The Natural Heritage Information Centre (NHIC) from the Ontario Ministry of Natural Resources (OMNR), is an open online mapping resource that identifies natural heritage areas in Ontario. According to the NHIC data available at the time of this study, no provincially significant wetlands or Areas of Natural Heritage & Scientific Interest (ANSI) were identified on the property or within a 10km buffer zone.[10] The lands outside of the property boundary are classified as natural heritage systems. These systems are natural core areas with key natural linkages, such as rivers and valleys that are identified by the OMNR for use in land use planning. These areas are defined by the Greenbelt Plan, the Oak Ridges Moraine Conservation Plan and the Niagara Escarpment Plan. During an analysis of the existing conditions of the site in October 2014, no areas of ecological significance that require further investigation were identified.

Vegetation

The CSC property is located within the Great Lakes-St. Lawrence Forest Region and is primarily under natural forest cover. Upland mixed forests, flood plain marshes, alders swamps, woody outcrops, and wetland-upland transitional vegetation are abundant in the surrounding area. The dominant vegetation throughout the Muskoka Region is comprised of deciduous forests. Species such as the white birch and sugar maple, occupy the higher, better drained areas along with balsam fir, white spruce, black ash and red maple in lower, more moist locations.

The surrounding lands of the property are primarily undeveloped forests with the dominant tree species comprised mainly of hardwood species such as White pine, Sugar maple, Yellow birch, Red oak and Beech.

Terrestrial Wildlife

A diversity of wildlife has been identified within and adjacent to the CSC property. This includes whitetail deer, black bear, red fox, muskrat, porcupine, snowshoe hare, striped skunk, raccoon, woodchuck, eastern chipmunk, eastern grey and red squirrel, hairy tail mole and little brown myotis. Amphibians found within the CSC property include the snapping turtle, red-backed salamander, American toad, spring peeper and several frogs (wood, leopard, green and bull frogs).

Fish

[10] Natural Heritage Information Centre. Accessed Nov 2015. GIS data. Ontario Ministry of Natural Resources. http://www.giscoeapp.lrc.gov.on.ca/web/MNR/NHLUPS/NaturalHeritage/Viewer/Viewer.html

Previous studies found young yellow perch, cyprinids, white sucker, brook stickleback and pumpkinseed in Beaver Creek. In addition, MNR has previously found significant warm water species including largemouth and smallmouth bass and black crappie.

Avian

Birds which have been observed on the property include the great blue heron, mallard, turkey vulture, ruffed grouse, American woodcock, ruby-throated hummingbird, belted kingfisher, pileated and downy woodpecker, least flycatcher, eastern pewee, tree and barn swallow, blue jay, common crow, black-capped chickadee, American robin, wood thrush, cedar waxwing, Philadelphia vireo, yellow warbler, ovenbird, common yellowthroat, American goldfinch, and chipping, swamp and song sparrows.

Species at Risk

The *Species at Risk Act* (SARA) is one of several federal, provincial, territorial, and international laws that share the goal of protecting wildlife species. The federal government's responsibility for listed aquatic species and birds covered by the *Migratory Bird Convention Act* means that the SARA prohibitions apply to these species wherever they are found in Canada and to all other listed species on federal lands. Species not protected by SARA may otherwise be protected through provincial legislation.

Federal designations of protected species at risk are listed under Schedule 1 of SARA. In Ontario, provincial designations of SAR are listed under the *Ontario Endangered Species Act* (OESA). Both Acts use the same designation categories, starting with the greatest concern: *extirpated*, *endangered*, *threatened* and *special concern.* Species not protected by SARA may be protected under the OESA. As the Beaver Creek Institution is located on federal land, Schedule 1 of SARA is applicable.

From a search feature of the Ontario Ministry of Natural Resources' (MNR) Species at Risk website, the species-at-risk that have occurred within the Muskoka area in which the site is located include the following:

- Birds
  - Barn Swallow (*Hirundo rustica*)
  - Bobolink (*Dolichonyx oryzivorus*)
  - Cerculean Warbler (*Dendroica cerulean*)
  - Eastern Meadowlark (*Sturnella magna*)
  - Henslow's Sparrow (*Ammodramus henslowii*)
  - Peregrine Falcon (*Falco peregrinus*)
  - Least Bittern (*Ixobrychus exilis)*

- Fish
  - Grass Pickerel (*Esox americanus vermiculatus*)
  - Lake Sturgeon (*Acipenser fulvescens*)
- Flora
  - Branched Bartonia (*Bartonia paniculata*)
  - Broad Beech Fern (*Phegopteris hexagonoptera)*
  - Engelmann's Quilwort (*Isoetes engelmannii*)
  - Forked Three-awned Grass (*Aristida basiramea*)
- Snakes and Lizards
  - Common Five-lined Skink (*Plestiodon fasciatus*)
  - Massasauga Rattlesnake (*Sistrurus catenatus*)
  - Milksnake (*Lampropeltis triangulum*)

    - Eastern Ribbonsnake (*Thamnophis sauritus*)
- Turtles
    - Northern Map Turtle (*Graptemys geographica*)
    - Snapping Turtle (*Chelydra serpentine)*
    - Blanding's Turtle - Great Lakes/ St. Lawrence population (*Emydoidea blandingii*)
    - Stinkpot – Eastern Musk Turtle (*Stenotherus odoratus*)
- Insects
    - Rusty-patched Bumble Bee (*Bombus affinis*)

A preliminary screening of potential species at risk on-site was conducted as part of the *Site Development and Parking Expansion Study* (CIMA Canada Inc., 2014). Based on CIMA Canada Inc.'s consultation with CSC, the following species at risk were observed within general area of the site over the past few years:

- Birds
    - Yellow Rail (*Coturnicops noveboracensis)*
    - Least Bittern *(Ixobrychus exilis)*
- Flora
    - Butternut (*Juglans cinerea)*
- Snakes and Lizards
    - Eastern Hog-Nose Snake (*Heterodon platirhinos*)
    - Milksnake (*Lampropeltis triangulum*)
    - Eastern Ribbonsnake (*Thamnophis sauritus*)
    - Five-lined Skink (Great Lakes / St. Lawrence population)
- Turtles
    - Blanding's Turtle - Great Lakes/ St. Lawrence population (*Emydoidea blandingii*)
    - Spotted Turtle (*Clemmys guttata*)
    - Stinkpot – Eastern Musk Turtle (*Stenotherus odoratus*)
- Insects
    - Monarch (*Danaus plexippus*)

The Muskoka region boasts a diverse ecosystem, due in part to the abundance of lakes, wetlands, creeks and forests. Twenty-seven (27) species at risk (SAR) were observed within the Muskoka area. This number is more than that identified by MNR. It is important to realize that the data in MNR's on-line resource is not exhaustive in that SAR not already identified and not yet included in said resource have been observed. Some of the SAR not included in MNR's resource were identified as potentials in the CIMA report. The habitat preferences of all these SAR were compared to current biophysical conditions of the property. As a due diligence all SAR either identified by MNR or the CIMA report were included.

If wildflowers and / or milkweed are present within the areas to be impacted by the proposed works or within areas of close proximity, there is potential for the occurrence of the **Monarch** (butterfly) within the areas of the project.

The areas surrounding the institutions contain habitat suitable for the **Milksnake**. The last confirmed observation of this species within the vicinity of the institutions was in 1899. Notwithstanding the date of this observation, the habitat preferences of this SAR is characterized as generalist, with preference toward rural areas with pastures, hayfields to rocky hillsides and a variety of forest types. There may be potential for the occurrence of this SAR near the vicinity of the project area, however with human activity during the parking lot expansion, the potential is anticipated to be low.

The potential for the occurrence of **Eastern Hog-nosed Snake** is low. While the eastern-most part of the existing parking lot where the project activities are proposed, lies immediately adjacent to natural areas, the presence of extensive human activity during the parking lot expansion should cause this species to refrain from entering within close proximity.

The potential for the occurrence of **Blanding's Turtle** is low. There may be conditions that may periodically occur during construction activities that suit the establishment of nests such as disturbed areas for nesting sites as this species prefers gravelly areas. Nests are typically established in spring and hatchlings emerge during the fall, therefore, nests, if any, would exist in the period during which construction is being planned. However, the potential should be low due to human activity.

The potential for the occurrence of **Snapping Turtle** is low. The pond located just east of Fenbrook Institution is likely suitable for this SAR as it prefers fresh bodies of water with little or no current. There is low potential for this species to occur at or within the vicinity of the project site due to human activity.

If any of these SAR are potentially in proximity to the institutions, it is much more likely that they would occur within the neighbouring undisturbed natural areas rather than within proximity to the project site. During the construction phase, it is likely that these species would avoid the project site due to the presence of humans and construction activity.

Table 2: Potential for Listed SAR to Occur within Areas of Proposed Project

Common and scientific name	SARA (Schedule1) designation	OESA designation	Habitat requirements	Potential
Birds				
Barn Swallow *(Hirundo rustica)*	No status	Threatened	Closely associated with human situations in rural areas. Would nest in a variety of artificial structures that provide either a horizontal nesting surface (e.g., a ledge) or a vertical face, with an overhang for shelter. Nests mostly located in and around open barns, garages, sheds, boat houses, bridges, road culverts, verandahs and wharfs as well as beams and posts, light fixtures, and ledges over windows and doors. Nests and foraging sites close to open habitats such as farmlands and wetlands.	None
Bobolink *(Dolichonyx oryziorus)*	Threatened	Threatened	Nests in forage crops (e.g., hayfields and pastures. occurs in various grassland habitats including wet prairie, peat lands and abandoned fields dominated by tall grasses, remnants of tall-grass prairie, no-till cropland, small-grain fields, restored surface mining sites and irrigated fields in arid regions.	None
Cerulean Warbler *(Dendroica cerulean)*	Special Concern	Threatened	Found in mature deciduous forests that feature large, tall trees and an open under story. Forests may be in wet bottomland areas or on dry ridges in upland locations.	None
Eastern Meadowlark	No Status	Threatened	Prefers native prairies and	None

(Sturnella magna)			savannahs, non-native pastures, hayfields, weedy meadows, herbaceous fence rows and airfields.	
Henslow's Sparrow (Ammondramus henslowii)	Endangered	Endangered	Prefers open fields with tall grasses that are interspersed with tall herbaceous plants, or shrubby species.	None
Yellow Rail (*Coturnicops noveboracensis)*	Special Concern	Special Concern	Prefers marshes with sedges and grasses with little standing water (0-12 cm water depth), and where the substrate remains saturated throughout summer. Can also be found in damp fields and meadows, on the floodplains of rivers and streams, in the herbaceous vegetation of bogs, and at the upper levels (drier margins) of estuarine and salt marshes.	None
Least Bittern *(Ixobrychus exilis)*	Threatened	Threatened	Prefers marshes emergent vegetation (such as cattails) surrounded by areas of open water.	None
Peregrine Falcon *(Falco peregrinus anatum/tundrius)*	Special Concern	Special Concern	Usually nests on cliff ledges or crevices, preferably 50 to 200 metres above ground, but also on the ledges of tall buildings or bridges, always near good foraging areas.	None
Plants				
Butternut (*Juglans cinerea)*	Endangered	Endangered	Grows within flood plains in rich, moist, and well-drained soils found along streams.	None
Branched Bartonia *(Bartonia paniculata)*	Threatened	Threatened	Grows in grass-like vegetation or low shrub sphagnum bog or fen habitat. Usually found growing on a peat substrate, and is associated with Larch and Black Spruce.	None
Broad Beech Fern *(Phegopteris hexagonoptera)*	No status	Special Concern	Grows in shady areas of beech and maple forests where the soil is moist or wet.	None
Englelmann's Quillwort (Isoetes englelmannii)	Endangered	Endangered	Grows along waterways where the water flow is regulated either for flood control or for electrical power generation.	None
Forked Three-awned Grass *(Aristida basiramea)*	Endangered	Endangered	Grows in dry, open, and sandy or disturbed areas.	None
Fish				
Grass Pickerel (*Esox americanus vermiculatus*)	Special Concern	Special Concern	Found in wetlands, ponds, slow-moving streams and shallow bays of larger lakes with warm, shallow, clear water and an abundance of aquatic plants. Also found in several tributaries and water bodies in the lower Lake Huron watershed.	None
Lake Sturgeon (*Acipenser fulvescens*)	No status	Threatened	Large rivers and lakes but in depth of usually less than 30 feet deep.	None
Snakes and Lizards				
Common Five-lined Skink (*Plestiodon fasciatus*)	Special Concern	Special Concern	Rocky outcrops, dunes, fields, and deciduous forests.	None - was detected at the property prior to

				the construction of Fenbrook Institution (1992) as reported in an Environmental Screening Report for the Proposed New Firing Range (PWGSC, 2012). The fen located within the institution may provide suitable habitat for this species and it was preserved as a provision of habitat for this species.
Massasauga Rattlesnake (*Sistrurus catenatus*)	Threatened	Threatened	Tall grass prairie, bogs, marshes, shorelines, forests and alvars.	None
Eastern Hog-nosed Snake *(Heterodon platirhinos)*	Threatened	Threatened	Prefers sandy, well-drained soil and open vegetative cover, such as open woods, brushland, fields, forest edges and disturbed sites.	Low
Milksnake (*Lampropeltis triangulum*)	Special Concern	Special Concern	Occurring in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types in rural areas. Frequently found in and around buildings, especially old structures.	Low
Eastern Ribbonsnake (*Thamnophis sauritus*)	Special Concern	Special Concern	As a semi-aquatic species, most frequently found along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover.	None
Turtles				
Northern Map Turtle (*Graptemys geographica*)	Special Concern	Special Concern	Inhabits lakes and rivers, with slow moving currents, muddy bottoms, and abundant aquatic vegetation.	None
Snapping Turtle (*Chelydra serpentine)*	Special Concern	Special Concern	Found in slow-moving water with a soft mud bottom and dense aquatic vegetation. Most often found in ponds, shallow bays or river edges, and slow streams, or areas combining several of these wetland habitats. Individual turtles will persist in golf course ponds and irrigation canals. Generally nest on sand or gravel banks along waterways.	Low
Stinkpot – Eastern Musk Turtle (*Stenotherus odoratus*)	Threatened	Special Concern	Prefers shallow water with little or no current, and soft earth to bury into when they hibernate.	None
Blanding's Turtle - Great Lakes/ St. Lawrence population (*Emydoidea blandingii*)	Threatened	Threatened	Prefers lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps that are shallow and rich in nutrients, organic soil and dense vegetation. Nests in dry conifer or	Low

			mixed hardwood forests, up to about 400 metres from any body of water. Females also prefer partially vegetated sites such as fields or roadways. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone.	
Insects				
Rusty-patched Bumble Bee (*Bombus affinis*)	Endangered	Endangered	Found in open habitat such as mixed farmland, urban settings, oak savannah, open woods and sand dunes.	None
Monarch (*Danaus plexippus*)	Special Concern	Special Concern	Occurs primarily wherever milkweed (Asclepius) and wildflowers (such as Goldenrod, asters, and Purple Loosestrife) exist. This includes abandoned farmland, along roadsides, and other open spaces where these plants grow.	Moderate - if these plants exist within close proximity to the proposed project area.

Socio-Economic Overview

Land Use

The heritage of Gravenhurst dates back to the 19th century, during a peak in the building and lumber industries. The high demand for lumber attracted settlers to Muskoka for the bountiful forests. As the industry grew, lumberyards and railways were built in the 1870's to transport the lumber across the province.

Not before long, the railway began to carry passengers to the Gravenhurst and Muskoka for the scenic features of the region. Hotels and resorts were built along shorelines and the lakes to boost the new tourist trade. A boat building industry sparked from the need to transport tourists to and from these resorts.

In the 1890's, several hospitals and treatment centres were built along the shore of Lake Muskoka for the chronically-ill, particularly tuberculosis patients. Fresh air and quiet relaxation was the prescribed treatment for tuberculosis patients, which was characteristic of the region. [11]

Currently, the site is comprised of the Beaver Creek Institution minimum facility and the Fenbrook Institution medium facility the descriptions of which are previously mentioned.

Archaeology and Cultural Heritage

Gravenhurst was officially incorporated as a town in 1887. It was also this year that a fire destroyed most of the buildings in the center of the town. Most of the remaining buildings present today were built after this time.

The current structures in and around Gravenhurst still reflect the historical value of the town. These include the Opera House built in 1901, the Carnegie Library built in 1922, and the Bethune Memorial House built in the 1880's, which remains a Natural Historic Site today. The train station, post office and several original churches, homes and downtown buildings remain in Gravenhurst today.

[11] http://www.gravenhurst.ca/en/discoverus/ourhistory.asp

It is unlikely that archaeological or cultural heritage elements are present within the property or project site as the institutions were built in a predominantly forested area away from Gravenhurst thus archaeological or cultural heritage features are not anticipated to be present. The expanded parking lot is immediately adjacent to the areas of the Beaver Creek/Fenbrook Institutions that have previously been disturbed as part of the institution's development. [12]

Environmental Effects - Methodology

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 aw well as 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. The additional environmental components considered under this report include Air Quality, Surface Water, Vegetation, Groundwater Quality, Soil, Birds and Wildlife, and Species at Risk.

[12] http://www.gravenhurst.ca/en/discoverus/ourhistory.asp

Table 3 : Potential Project / Environment Interactions Matrix

P = Potential Effect of Project on Environment; Blank = No Interaction

	As per Section 5(1)			Section 5(1c) Aboriginal Interest				Section 5(2)			Due Diligence					
Project Phase	*Fish (Fisheries Act)*	*Aquatic Species (SARA)*	*Birds (MBCA)*	*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*	*Soil*	*Vegetation*	*Terrestrial Species at Risk*	*Air Quality*
Site Preparation																
Asphalt removal from the existing parking lot.											*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*
Parking Lot Installation & Reconfiguration																
Install asphalt parking area			*P*								*P*	*P*	*P*		*P*	*P*
Operation																
Parking Lot Operation											P					

*HAPA –*structure, site or thing that is of historical, archaeological, paleontological or architectural significant*

Evaluation of Environmental Effects

The VECs selected in **Table 3** are addressed in **Table 5** below. 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 Table 4.

Table 4. Assessment Criteria for Determination of Significance.

Magnitude	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
Reversibility	Reversible	Effect can be reversed
	Irreversible	Effects are permanent
Geographic Extent	Immediate	Confined to project site
	Local	Effects beyond immediate project site but not regional in scale
	Regional	Effects on a wide scale
Duration	Short Term	Between 0 and 6 months in duration
	Medium Term	Between 6 months and 2 years
	Long Term	Beyond 2 years
Frequency	Once	Occurs only once
	Intermittent	Occurs occasionally at irregular intervals
	Continuous	Occurs on a regular basis and regular intervals

Table 5: Environmental Effects Analysis – Mitigation Measures and Residual Effects

Valued Ecosystem Component (VEC)/ Valued Social Component (VSC)	Description of Potential Project Interaction with VEC/VSC	Mitigation Measures[13]	Residual Effects[14]	Significance of Residual effects[15]	Further Study or Follow up
Air Quality	Potential for fumes and air emissions from construction materials and vehicle/machinery to degrade air quality during site preparation and parking lot installation.	Vehicles/machinery to be in good repair, equipped with emission controls as applicable and operated within regulatory requirements. Vehicles and machinery should not be left idling while not in use. Minimize vehicle traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material. Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Undertake misting, create localized wind barriers or implement other methods particularly during dry, dusty conditions to avoid generating airborne or surface dust and particulates. Stabilize areas of stockpiled or exposed soils. Avoid activities with potential to release airborne particulates during windy and prolonged dry periods.	Minimal potential for the degradation of local air quality from construction activities. Impacts would not be significant as they would: result in small increase compared to background; be reversible over time; be located only in immediate area of project; take place for up to 6 months; and even though they would occur continuously during site preparation and parking lot installation.	-1	No

[13] Although some of the pertinent legislation, regulations, guidelines and policies are noted in the mitigation, the information is not considered necessarily complete. Furthermore, it is to be expected that new, amended, modified or otherwise updated legislation, regulations, guidelines and policies will come available over time. The Contractor is responsible to ensure that all applicable legislation, regulations, guidelines and policies are adhered to.

[14] Residual Effects and Significance of Residual Effects evaluated in accordance with criteria in Table 4.**Error! Reference source not found.**

[15] Significance of Residual Effects rated as follows:

0 = None, 1 = Not significant, 2 = Significant, 3 = Unknown, Positive (+), Negative (-)

Valued Ecosystem Component (VEC)/ Valued Social Component (VSC)	Description of Potential Project Interaction with VEC/VSC	Mitigation Measures[13]	Residual Effects[14]	Significance of Residual effects[15]	Further Study or Follow up
		Keep the main entrance road clear of any mud or earth tracked from vehicles. Keep asphalt pavement surfaces clean of debris resulting from removal operations.			
Surface Water	Potential for debris and other materials (e.g. concrete, petroleum products or other deleterious substances) during construction, and operational activities to enter drainage ditches and ultimately into Beaver Creek, Reay Lake or storm water retention pond.	All activities including maintenance procedures should be controlled to prevent the entry of concrete, petroleum products, or other deleterious substances into the water. Construction machinery and equipment is to arrive on-site in a clean condition and be maintained free of fluid leaks. Maintenance of vehicles and equipment to be carried out on pre-designated location more than 30 m from any wetlands or water bodies. Ensure site drainage conditions are accounted for in site development plans. An erosion and sediment control 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. Plan shall be in place prior to conducting work. Sediment and erosion control plan should consider the following: • Implement temporary erosion and sediment control measures to prevent erosion/runoff from impacting wetland areas. Maintain	Minimal/remote potential for sediments, dust or contaminants (concrete, lead, fuel, waste water) to enter Beaver Creek, Reay Lake and storm retention pond since they are between 200 metres to 1 km away from project site. Implementation of an erosion and sediment control plan should mitigate risk of potential impacts to surface water. Impacts would not be significant as they would: result in small increase compared to background; be reversible over time; be located only in immediate area of project; take place for up to 6 months; and occur infrequently during construction and operation.	-1	No

Valued Ecosystem Component (VEC)/ Valued Social Component (VSC)	Description of Potential Project Interaction with VEC/VSC	Mitigation Measures[13]	Residual Effects[14]	Significance of Residual effects[15]	Further Study or Follow up
		these measures until the site has stabilized. • Inlet protection at all existing catch basins/storm drains/outfalls (that is, those which are not being immediately replaced) should be installed prior to the commencement of construction and will remain functional until construction completion. • 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 resolved. • Restore disturbed areas as soon as possible to minimize the duration of soil exposure. Restoration should be to a pre-disturbed state or better.			
Vegetation	Potential for vegetation not in the project scope to be disturbed and removed during the site preparation and parking lot installation.	Minimize damage and removal of vegetation to the extent possible including consideration of minimal road re-routing and restore vegetation where feasible. Vegetation selected for removal or protection will be identified and specific protection barriers will be installed where required prior to construction. If possible, trees that are removed from the site will be replanted on the CSC property. Establish staging areas and site access	Impacts would not be significant as they would: result in limited removals of vegetation compared to the entire site; be reversible over time (potential for replanting elsewhere); be located only in immediate area of project; take place for up to 6 months; and occur infrequently during	-1	No

Valued Ecosystem Component (VEC)/ Valued Social Component (VSC)	Description of Potential Project Interaction with VEC/VSC	Mitigation Measures[13]	Residual Effects[14]	Significance of Residual effects[15]	Further Study or Follow up
		routes away from existing trees/naturalized vegetation to the extent possible. All exposed soils shall be stabilized and re-vegetated as soon as possible (during the growing season) and in conjunction with planting works. Vegetation will be restored upon completion of construction using native species, non-invasive species typical of the locality and soils to restore pre-construction conditions. Construction activities are to minimize disturbance to grassed areas. Any grassed areas to be used for construction activities are to be cleared and stripped and topsoil is to be stockpiled. Areas are to be stabilized after construction activities are complete.	construction.		
Groundwater Quality	Potential contamination of groundwater during construction and operations through accidental spills.	Designated fuelling area(s) will be established. A Spills Management and Emergency Response Plan will be developed and implemented. All workers should be fully aware of the spill prevention and response procedures including notification of the CSC and MOE Spills Action Centre at 1-800-268-6060 (toll free). Spill kits shall be kept on-site during all project phases. Disposal of waste generated by a spill will be done in compliance with Ontario Waste Regulations and at an MOE-approved	All significance criteria are rated low except geographic extent and duration as the potential for groundwater contamination through accidental spills will continue through operations as there are always vehicles on site. No significant adverse effect on Groundwater Quality anticipated.	-1	No

Valued Ecosystem Component (VEC)/ Valued Social Component (VSC)	Description of Potential Project Interaction with VEC/VSC	Mitigation Measures[13]	Residual Effects[14]	Significance of Residual effects[15]	Further Study or Follow up
		disposal facility.			

Soil	Potential contamination and disturbance of soil during construction and operations through vehicle movement and accidental spills.	Avoid the movement of heavy machinery in areas of sensitive slopes, use wooden planks if necessary. Avoid using heavy machinery on land during wet weather. Reduce soil compaction by restricting large machinery to the designated staging area. To minimize land disturbance, the construction envelope will be clearly demarcated and kept as small as possible. Develop and implement an erosion control plan to re-vegetate or otherwise stabilize any loose soils after construction to prevent erosion and transport (e.g., erosion blanket seeded with native non-invasive species). See also mitigation measures for Groundwater Quality.	All significance criteria are rated low except duration as the potential for soil contamination through accidental spills and vehicle movement will continue through operations as there are always vehicles on site. No significant adverse effect on Soil anticipated.	-1	No
Birds and Wildlife	Potential disturbances to the birds and wildlife in the area from construction activities (i.e. generation of noise and dust).	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 temporarily ceasing work which would pose immediate threat and then waiting for the individual to flee the site for alternative cover). All work is to be undertaken in compliance with Migratory Birds Convention Act and with local noise bylaws. If a migratory bird is found to be using the construction area for breeding or nesting, the contractor will halt work. Environment Canada must be contacted for further	Minimal potential for dust and generation of noise to disturb birds and wildlife due to small magnitude, limited geographical extent, and duration of construction activities.	-1	No

		guidance prior to work commencing. Minimize duration and extent of disturbance to existing vegetation and natural areas serving as habitat. Minimize the frequency of dust-generating construction activities during prolonged periods of dry weather. Restore disturbed areas with native vegetation upon completion of construction to promote long term naturalization to original condition. In areas adjacent to sensitive wildlife areas, restrict operation to daylight hours to the extent practicable to avoid disturbance during prime periods for wildlife movement (i.e. dawn and dusk).			
Species at Risk	Potential disturbance of species at risk or destruction of their habitat.	Each day prior to commencement of work, a search of the work site shall be conducted to ensure that there are no SAR present at the work site. Should a SAR individual be encountered, measures are to be implemented to avoid destruction, injury or interference with the species, its residence and/or its habitat (e.g., through sighting, timing or design changes). If the foregoing cannot be avoided the Contractor should cease work and contact Environment Canada for advice regarding mitigation measures. In the event that it is determined that the project likely may have unexpected adverse effects on species at risk (SAR), the respective competent Minister (i.e., Environment Canada for migratory birds) SAR should be immediately notified.	The magnitude, geographic extent and ecological context are rated low as there is no critical SAR habitat located in the footprint of the parking area. The duration, frequency, permanence and ecological context are low. The minimal vegetation/potential habitat to be removed is already adjacent to disturbed areas with low likelihood of providing habitat for SAR. No significant adverse effect on SAR species or	-1	No.

		Install perimeter silt fencing to prevent SAR from entering the construction zone (turtles and snakes). To the extent possible, vegetation clearing should occur before or after monarch migration to avoid impacts to this species. This species typically resides in Ontario between May and September and may be encountered in various life stages on host vegetation (milkweed). To the extent possible, vegetation clearing will be undertaken outside of the breeding season for birds. Clearing is to be avoided from April 15 to July 31.	critical habitat of SAR species anticipated.		

PART D: CONSULTATIONS

Public Consultation

The potential for public concern is minimal due to the relatively small scale of the project, and the fact that the project will be conducted on federal land in accordance with provincial and federal environmental regulatory requirements. Therefore public consultation was not deemed to be required as part of the preparation of this EEE. Please refer to **Appendix C** on *Record of Public Participation Determination*.

Aboriginal Communication

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. No Aboriginal concerns have been raised in the past for any projects taking place at this project site.

No community or aboriginal knowledge was sought in terms of the Environmental Effects Evaluation as the proposed site is on Correctional Services Canada property which has already been significantly disturbed.

Provincial Agency Consultation

CSC is proposing the project on federal land and does not require any environmental licenses or permits from other provincial/municipal agencies. Based on this information and the general nature of the project site and limited project activities, agency consultation was not deemed necessary and therefore not conducted as part of this evaluation.

Federal Department Consultation

CSC is proposing the project on their land and does not require any environmental licences or permits from other federal departments. Additionally, none of the activities will require in-water work.

PART E: ENVIRONMENTAL EFFECTS EVALUATION CONCLUSION

Potential impacts of this project are associated with Air Quality, Surface Water, Vegetation, Groundwater Quality, Soil, Birds and Wildlife, and Species at Risk. It is reasonable to conclude that with appropriate mitigation in place and good work practices, environmental effects will be of short duration and the potential zone of influence will be confined to the immediate vicinity.

PART F: ACCURACY AND COMPLIANCE MONITORING

A follow-up program (as defined in S. 2(1) and as applicable to non-designated projects on federal lands) is a program for determining the effectiveness of any mitigation measures.

_X_ Follow-up program is not likely required for this project. However, 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.

___ Follow-up program is required for this project. The proponent must provide site access to Responsible Authority officials and/or its agents upon request.

Monitoring to track the implementation of mitigation measures is required in order for PWGSC to ensure that mitigation measures are being adhered to. All required mitigation measures from Table 5 are summarized in the Mitigation Monitoring Report form, **Appendix B**.

Prepared by: _____ Date: 2016-06-02
Lee Chan, Environmental Specialist, PWGSC, Ontario Region

The above has completed this environmental effects evaluation report to the best of their ability and knowledge.

Reviewed by: _____ Date: 06/06/2016
Suzanne LaPerrière, Manager, Environmental Regulations & Sustainability
PWGSC, Ontario Region

The above has reviewed this environmental effects evaluation (EEE) report and agrees that it meets the requirement of the Canadian Environmental Assessment Act, 2012.

PART G: DETERMINATION

The federal authority is required to provide a determination of the significance of environmental effects as a result of funding 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: CSC Beaver Creek Institution – New Parking Lot Extension
PWGSC Project #: R.079593.001
Location: Beaver Creek Institution, Ontario

The Federal Authority has evaluated the project for significant adverse environmental effects as required under Section 67 of *Canadian Environmental Assessment Act (CEAA), 2012.* 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.

X Project not likely to cause significant adverse environmental effects when mitigation measures are implemented - 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.

PART H: SIGNATURE CERTIFICATE

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.*

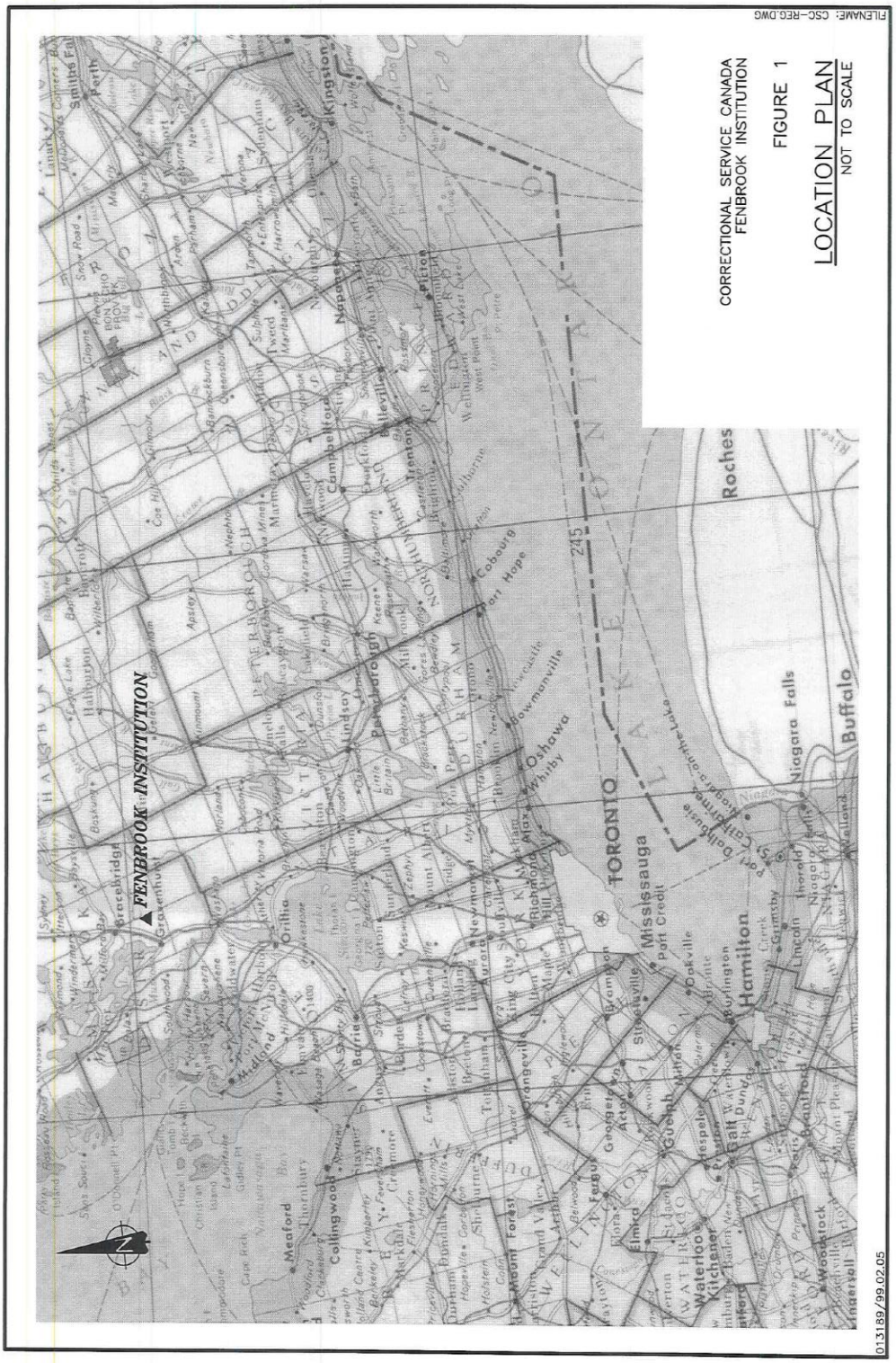
Accepted by: _____ Date: June 3, 2016
Assad Ghubril, Senior Project Manager, PWGSC, Ontario Region

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.

Approved by: _____ Date: June 3/16
Dawne Flaborea, A/Director - Environmental Protection Programs, Technical Services and Facilities, NHQ, 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.

APPENDIX A
FIGURES

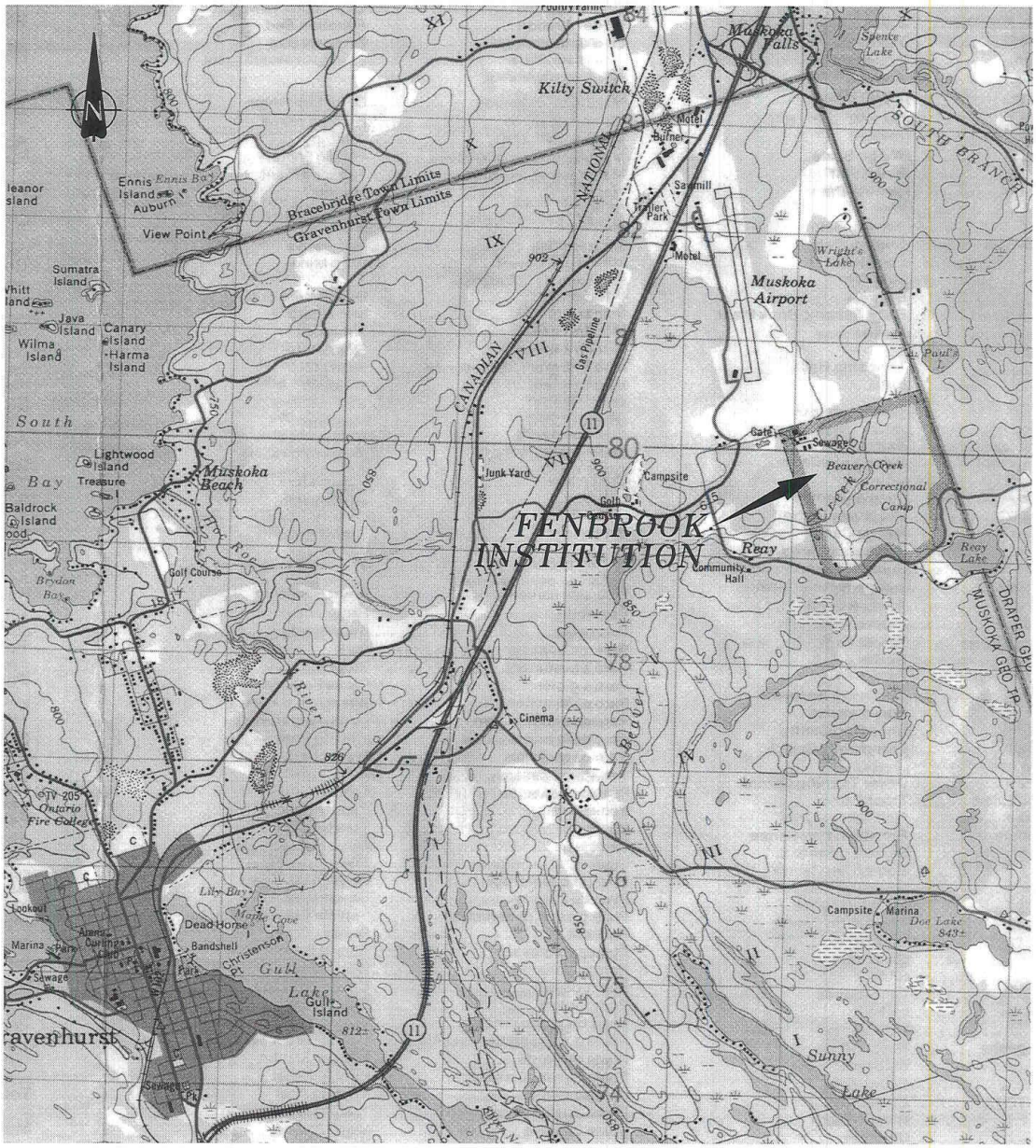


CORRECTIONAL SERVICE CANADA
FENBROOK INSTITUTION

FIGURE 1

LOCATION PLAN
NOT TO SCALE

Note: Beaver Creek and Fenbrook Institutions are located within the same CSC property.



CORRECTIONAL SERVICE CANADA
FENBROOK INSTITUTION

FIGURE 2

SITE PLAN
NOT TO SCALE

013189/99.02.02

FILENAME: CSC-GRAV.DWG

Note: Beaver Creek and Fenbrook Institutions are located within the same CSC property.

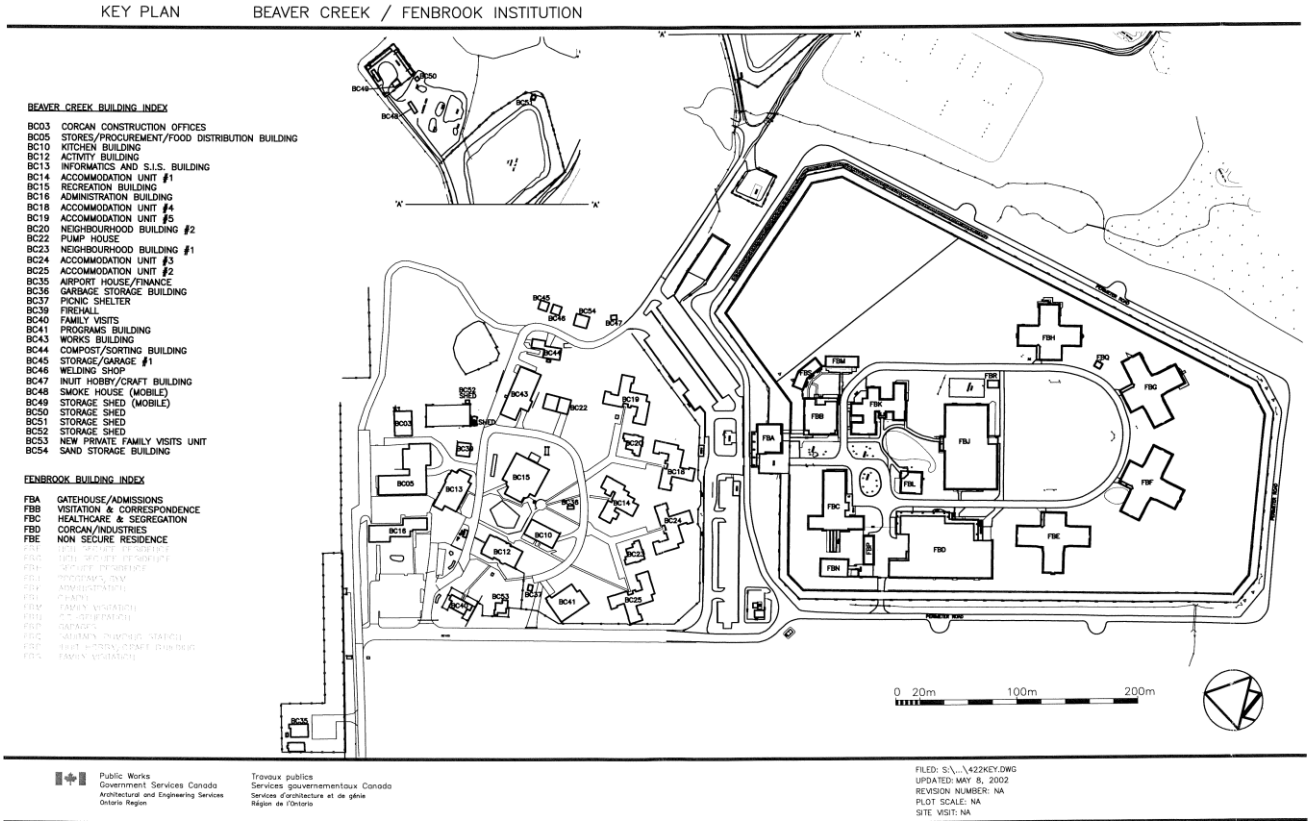


Figure 3: Facility Layout of Beaver Creek and Fenbrook Institutions

APPENDIX B

MITIGATION MONITORING REPORT FORM

Project Name: CSC Beaver Creek Institution – New Parking Lot Extension
PWGSC Project #: R.079593.001
Location: Beaver Creek Institution, Ontario

The purpose of this record is to monitor the implementation of mitigation measures and best management practices identified in the Environmental Effects Evaluation. It is the responsibility of the Project Manager to ensure that this record is completed over the duration of the project. This environmental Mitigation Monitoring Report form must be completed in full. Specify in the table below whether the mitigation measures and best management practices set out in the environmental assessment have been applied. If a mitigation measure has not been applied, specify the reason(s) why this was not done.

Furthermore although some of the pertinent legislation, regulations, guidelines and policies are noted in the mitigation, the information is not considered necessarily complete. It is to be expected that new, amended, modified or otherwise updated legislation, regulations, guidelines and policies will come available over time. The contractor is responsible to ensure that all applicable legislation, regulations, guidelines and policies are adhered to.

Environmental Mitigation Measure	**Implementation Schedule/Date**	**Person/Title/ Firm Responsible**	**Compliance (Task Complete – Yes or No/Date)** **If No, provide reason**
Air Quality			
Vehicles/machinery to be in good repair, equipped with emission controls as applicable and operated within regulatory requirements. Vehicles and machinery should not be left idling while not in use. Minimize vehicle traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material. Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Undertake misting, create localized wind barriers or implement other methods particularly during dry, dusty conditions to avoid generating airborne or surface dust and particulates.			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes or No/Date) If No, provide reason
Stabilize areas of stockpiled or exposed soils. Avoid activities with potential to release airborne particulates during windy and prolonged dry periods. Keep the main entrance road clear of any mud or earth tracked from vehicles. Keep asphalt pavement surfaces clean of debris resulting from removal operations.			
Surface Water			
All activities including maintenance procedures should be controlled to prevent the entry of concrete, petroleum products, or other deleterious substances into the water. Construction machinery and equipment is to arrive on-site in a clean condition and be maintained free of fluid leaks. Maintenance of vehicles and equipment to be carried out on pre-designated location more than 30 m from any wetlands or water bodies. Ensure site drainage conditions are accounted for in site development plans. An erosion and sediment control plan should be developed to mitigate potential effects on water quality, and appropriate measures should be adopted to minimize any impacts of accidental spills during construction. Plan shall be in place prior to conducting work. Implement temporary erosion and sediment control measures to prevent erosion/runoff from impacting			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes or No/Date) If No, provide reason
adjacent wetland area. Maintain these measures until the site has stabilized. Inlet protection at all existing catch basins/storm drains/outfalls (that is, those which are not being immediately replaced) should be installed prior to the commencement of construction and will remain functional until construction completion. 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 resolved. Restore disturbed areas as soon as possible to minimize the duration of soil exposure. Restoration should be to a pre-disturbed state or better.			
Vegetation			
Minimize damage and removal of vegetation to the extent possible including consideration of minimal road re-routing and restore vegetation where feasible. Vegetation selected for removal or protection will be identified and specific protection barriers will be installed where required prior to construction. If possible, trees that are removed from the site will be replanted on the CSC property. Establish staging areas and site access routes away from existing trees/naturalized vegetation to the extent possible. All exposed soils shall be stabilized and re-vegetated as soon as possible (during the growing season) and in conjunction with planting works.			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes or No/Date) If No, provide reason
Vegetation will be restored upon completion of construction using native species, non-invasive species typical of the locality and soils to restore pre-construction conditions. Construction activities are to minimize disturbance to grassed areas. Any grassed areas to be used for construction activities are to be cleared and stripped and topsoil is to be stockpiled. Areas are to be stabilized after construction activities are complete.			
Groundwater			
Designated fuelling area(s) will be established. A Spills Management and Emergency Response Plan will be developed and implemented. All workers should be fully aware of the spill prevention and response procedures including notification of the CSC and MOE Spills Action Centre at 1-800-268-6060. Spill kits shall be kept on-site during all project phases. Disposal of waste generated by a spill will be done in compliance with Ontario Waste Regulations and at an MOE-approved disposal facility.			
Soil			
Avoid the movement of heavy machinery in areas of sensitive slopes, use wooden planks if necessary. Avoid using heavy machinery on land during wet weather. Reduce soil compaction by restricting large machinery to the designated staging area. To minimize land disturbance, the construction			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes or No/Date) If No, provide reason
envelope will be clearly demarcated and kept as small as possible. Develop and implement an erosion control plan to re-vegetate or otherwise stabilize any loose soils after construction to prevent erosion and transport (e.g., erosion blanket seeded with native non-invasive species). See also mitigation measures for Groundwater Quality.			
Birds and Wildlife			
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, wait for the individual to flee the site for alternative cover. All work is to be undertaken in compliance with Migratory Birds Convention Act and with local noise bylaws. If a migratory bird is found to be using the construction area for breeding or nesting, the contractor will halt work. Environment Canada must be contacted for further guidance prior to work commencing. Minimize duration and extent of disturbance to existing vegetation and natural areas serving as habitat. Minimize the frequency of dust-generating construction activities during prolonged periods of			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes or No/Date) If No, provide reason
dry weather. Restore disturbed areas with native vegetation upon completion of construction to promote long term naturalization to original condition. In areas adjacent to sensitive wildlife areas or corridors, restrict operation to daylight hours to the extent practicable to avoid disturbance during prime periods for wildlife movement (i.e. dawn and dusk).			
Species at Risk			
Each day prior to commencement of work, a search of the work site shall be conducted to ensure that there are no SAR present at the work site Should a species or its critical habitat be encountered, measures are to be implemented to avoid destruction, injury or interference with the species, its residence and/or its habitat (e.g., through sighting, timing or design changes). If the foregoing cannot be avoided the Contractor should cease work and contact Environment Canada for advice regarding mitigation measures. In the event that it is determined that the project likely may have unexpected adverse effects on species at risk (SAR), the respective competent Minister (i.e., Environment Canada for migratory birds) SAR should be immediately notified. Install perimeter silt fencing to prevent SAR from entering the construction zone (frogs, turtles and snakes). To the extent possible, vegetation clearing should occur before or after monarch migration to avoid impacts to this species. This species typically			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes or No/Date) If No, provide reason
resides in Ontario between May and September and may be encountered in various life stages on host vegetation (milkweed). To the extent possible, vegetation clearing will be undertaken outside of the breeding season for birds. Clearing is to be avoided from April 15 to July 31.			

NOTES: _____

Environmental Assessment Mitigation Monitoring Report Form Completed By:

Name: _____ Title: _____

Company: _____ Phone No.: _____

Signature: _____ Date: _____

APPENDIX C

RECORD OF PUBLIC PARTICIPATION DETERMINATION

Record of Public Participation Determination

Is there an indication that…	Describe potential indication and issues	Consider public participation?	
There is an existing or likely public interest in the type, location or potential effects of the project?		☐ Yes	☒ No
There are members of the public with a history of being involved in past proposed projects in the area?		☐ Yes	☒ No
The project has the potential to generate conflict between environmental and social or economic values of concern to the public?		☐ Yes	☒ No
The project may be perceived as having the potential for significant adverse environmental effects? [16]		☐ Yes	☒No
There is potential to learn from community ecological? knowledge or Aboriginal traditional knowledge?		☐ Yes	☒ No
There is uncertainty about potential direct and indirect environmental effects or the significance of identified effects?		☐ Yes	☒ No
The project has been or will be subject to other public participation processes,		☐ Yes	☒ No
There is any other reason why public participation is or is not appropriate?		☐ Yes	☒ No

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

☐ Yes ☒ No

Additional comments to support determination:

[16] *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.*