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PARKS CANADA

SPECIFICATION

Trout Brook Campground
Foundation Package

CAPE BRETON HIGHLANDS NATIONAL PARK, NS

ISSUED FOR TENDER

2018-08-13

DISCIPLINE	DATE	STAMP
Structural Specifications:	August 13, 2018	
Electrical Specifications:	August 13, 2018	
Mechanical Specifications:	August 13, 2018	

END OF SECTION

Division 01 – GENERAL REQUIREMENTS

Division 22 – PLUMBING

Division 26 – ELECTRICAL

END OF SECTION

Part 1 General

1.1 ROLES, RESPONSIBILITIES AND DEFINITIONS

.1 All references to the Departmental Representative shall mean:

.1 A representative of Parks Canada.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 The Work of this Contract generally includes the supply and installation of all labour, services, materials, testing and equipment to complete the Trout Brook Campground Sitework (the Work) as indicated on the drawings and Work as indicated herein. The Work shall include but is not limited to:

.1 Site mobilization/demobilization.

.2 Supply, installation and maintenance of any sediment and erosion controls required during construction. Plan shall be submitted for Departmental Representative prior to the start of construction.

.3 Materials testing and quality control.

.4 Supply and installation of temporary utilities and construction facilities as required including subsequent removal from site.

.5 Supply of traffic control including traffic control devices and signage to block off the work area during the construction period. A Plan shall be submitted to the Departmental Representative at the start of construction for review and approval indicating work schedule, and how traffic controls are implemented.

.6 Submission of a record information package including mark-ups, a construction survey and a warranty and maintenance plan.

.7 Supply, installation, compaction and testing of concrete piers.

.8 Supply, installation, compaction and testing of concrete slab.

.9 Supply and installation of all servicing connection through the slab.

.10 Supply and installation of below slab drainage, water and trap primer piping with capped stub connections through the slab.

.11 General site reinstatement and clean-up.

1.3 CONTRACT METHOD

.1 Construct Work under a lump sum contract.

1.4 WORK SEQUENCE

.1 Contractor to construct the Work in a continuous sequence upon contract award and complete the Work no later than December 30, 2018.

1.5 CONTRACTOR USE OF PREMISES

.1 Contractor must only work in designated work site locations and work access travel corridors which include approved roadways and trails only. The corridors and work site

will be marked and agreed upon by Parks Canada and Constructor prior to commencing construction. Absolutely no damage outside of these limits is to occur by the Contractor.

.2 Contractor will have joint use of this property with Parks Canada during the construction period and must ensure all construction activities in overlapping areas are well coordinated in advance.

.3 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.4 At completion of Construction, return disturbed areas to equal condition or better condition than existed before Work started.

1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING FACILITIES

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

1.7 EXISTING SERVICES

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

.2 Give the Departmental Representative 48 hours of notice for necessary interruption of services throughout course of work. Minimize duration of interruptions.

.3 Establish location and extent of service lines in area of work before starting Work by careful test excavation methods. Notify Departmental Representative and Departmental Representative of findings. Note there will be one active water well on this site during construction. Note there is a Bell Aliant emergency phone line that runs parallel to the Cabot Trail within the property of the new Trout Brook Campground

.4 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service. Adhere to approved schedule and provide notice to affected parties.

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

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

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

1.8 CONSTRUCTION SURVEYING SERVICES

.1 Acquire the services of a Construction Surveyor to establish an accurate location of the installation of new Works within the construction area.

.2 Prior to commencing with infrastructure confirmations and locations, all parties involved with the test excavation should visit the site and become acquainted with current site conditions.

.3 Contractor shall have reference points established on site by the Construction Surveyor.

.4 Contractor shall survey all abandoned, capped, new and existing exposed utilities within the open trench area prior to backfilling operations.

.5 Contractor shall survey all new Works installed above and below grade. An as-built topographic survey shall be submitted to the Departmental Representative for approval in order to obtain Substantial Performance of the Work. The submittal shall include an ASCII or .csv raw points file and an AutoCAD file in dwg format.

1.9 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each document as follows:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Erosion and Sedimentation Control Plan.
- .12 Traffic Plan.
- .13 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 GENERAL REQUIREMENTS OF THE BID AND ACCEPTANCE FORM

.1 Lump Sum price bids are full compensation for the work necessary to complete each item in the Contract and in combination for all work necessary to complete the Work as a whole.

1.2 MEASUREMENT AND PAYMENT

.1 LUMP SUM: All work is to be completed in a single Lump Sum Item on the Bid Form.

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 11 00 – Summary of Work.

1.2 ADMINISTRATIVE

.1 The Contractor shall schedule and administer project meetings throughout the progress of the work.

.2 The Contractor shall provide physical space and make arrangements for meetings at their site trailer.

.3 The Departmental Representative will record the meeting minutes and include significant proceedings and decisions and identify actions by parties.

.4 The Departmental Representative will reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and affected parties not in attendance.

.5 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.3 PRECONSTRUCTION MEETING

.1 Upon issuance of "Issued for Construction" drawings, the Contractor shall arrange a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Representatives of the Departmental Representative, Contractor, Subcontractors, field inspectors and supervisors should be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

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

.5 Agenda to include:

- .1 Appointment of official representative of participants in the Work.
- .2 Schedule of Work.
- .3 Schedule of submission of shop drawings.
- .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities and fences (if deemed required).
- .5 Delivery schedule of specified equipment.
- .6 Site security.
- .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime and administrative requirements.

.8 Monthly progress claims, administrative procedures, photographs, and hold backs.

.9 Appointment of inspection and testing agencies or firms.

.10 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

.1 During course of Work the Contractor shall schedule weekly progress meetings.

.2 Contractor, Subcontractors and Departmental Representative are to be in attendance.

.3 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 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work.

.2 Section 01 33 00 – Submittal Procedures.

1.2 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 the Department Representative to enable monitoring of project work in relation to established milestones.

1.3 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 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to the 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 Provide schedule in PDF format.

1.5 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule.

.2 Ensure detailed Project Schedule includes as a minimum, milestone and activity types as follows:

.1 Award.
.2 Shop drawings and submittals.
.3 Permits.
.4 Mobilization/demobilization.
.5 Construction activities.
.6 Testing (as required).

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on 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.

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.

.2 Section 01 78 00 – Closeout Submittals.

1.2 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 and product data in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Nova Scotia, Canada as 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 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 Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, in electronic PDF format, 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 shall include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.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 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit 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.

.13 Submit electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.14 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.15 Submit electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Delete information not applicable to project.

.17 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, 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.

1.4 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of 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 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Province of Nova Scotia

.1 Occupational Health and Safety Act, S.N.S. - Updated 2013.

1.2 DEFINITIONS

.1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

.2 Competent Person means a person to who is:

.1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace.

.2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work.

.3 Knowledgeable about potential or actual danger to health or safety associated with the Work.

.3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.4 PPE: personal protective equipment.

.5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan prior to commencement of Work:

.1 Submit within ten (10) work days of notification of Bid Acceptance. Provide three (3) hard copies and one (1) electronic PDF file.

.2 Departmental Representative will review Health and Safety Plan and provide comments.

.3 Revise the Plan as appropriate and resubmit within five (5) work days after receipt of comments.

.4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor’s overall responsibility for Occupational Health and Safety of the Work.

.5 Submit revision and updates made to the Plan during the course of Work.

.3 Submit name of designated Health & Safety Site Representative and support documentation specified in the Safety Plan.

.4 Submit building permit, compliance certificates and other permits obtained.

.5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other department of labour organization:

.1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.

.6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit copies of incident reports.

.8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.4 COMPLIANCE REQUIREMENTS

.1 Comply with the Occupational Health and Safety Act for the Province of Nova Scotia, and the Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.

.3 Observe and enforce construction safety measures required by:

.1 1995 National Building Code of Canada, Part 8.

.2 Provincial Worker's Compensation Board.

.3 Municipal statutes and ordinances.

.4 Comply with Occupational R.S.Q., c. S-2.1, an Act respecting Health and Safety Code for the Construction Industry.

.4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

.5 A copy of the Canada Labour Code Part II may be obtained by contacting:

Canadian Government Publishing
Public Works & Government Services Canada
Ottawa, Ontario K1A 0S9
Tel: (819) 956-5800 (1-800-635-7943)
Publication No. L31-85/2000 E or F

.6 Observe construction safety measures of:

.1 Part 8 of National Building Code.

.2 Municipal by-laws and ordinances.

.7 In case of conflict or discrepancy between above specified requirements, the more stringent shall apply.

.8 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.

.9 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 SITE CONTROL AND ACCESS

.1 Control the Work and entry points to Work Site. Approve and grant access only to workers and authorized persons. Immediately stop and remove non-authorized persons:

.1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.

.2 Isolate Work Site from other areas of the premises by use of appropriate means:

.1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment.

.2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.

.3 Use professionally made signs with bilingual message in the two (2) official languages or international known graphic symbols.

.3 Provide safety orientation session to persons granted access to Work Site. Advise of hazards and safety rules to be observed while on site.

.4 Ensure persons granted site access wear appropriate PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.

.5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm.

1.6 PROTECTION

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

.2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of Work, immediately take measures to rectify situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

1.7 RESPONSIBILITY

.1 Be responsible for safety of persons and property on work site and for protection of employees and general public circulating adjacent to work operations 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.

1.8 FILING OF NOTICE

.1 File Notice of Project and other Notices with Provincial authorities prior to commencement of Work.

.2 Upon request, Departmental Representative will provide name and mailing address of provincial department to whom the Notice of Project must be sent.

.3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.9 PERMITS

.1 Obtain permits, licenses and compliance certificates, at appropriate times and frequency as stipulated by authorities having jurisdiction.

.2 Where particular permit or compliance certificate cannot be obtained at the required stage of work, notify Departmental Representative in writing and obtain Departmental Representative's approval to proceed prior to carrying out that portion of work.

.3 Post all permits on site. Submit copies to Departmental Representative.

1.10 SAFETY ASSESSMENTS

.1 Implement and carry out a health and safety hazard assessment program as part of the work. Program to include:

.1 Initial hazard assessment carried out immediately upon notification of contract award and prior to commencement of work.

.2 On-going hazard assessments performed during the progress of work identifying new or potential health risks and safety hazards not previously known. As a minimum, hazard assessments shall be carried out when:

.1 New subtrade work, new subcontractor(s) or new workers arrive at the site to commence another portion of the work.

.2 The scope of work has been changed by Change Order.

.3 Potential hazard or weakness in current health and safety practices are identified by Departmental Representative or by an authorized safety representative.

.3 Hazard assessments to be project and site specific, based on review of contract documents, site and weather conditions.

.4 Each hazard assessment to be made in writing. Keep copies of all assessments on site for duration of work. Upon request, make available to Departmental Representative for inspection.

1.11 PROJECT/SITE CONDITIONS

.1 The following are known or potential project related safety hazards at site:

.1 Work immediately adjacent/atop high steep embankments and cliffs with heavy equipment and construction personnel.

.2 Highway traffic.

.3 Other construction contractors work on site.

.2 Above lists shall not be construed as being complete and inclusive of safety and health hazards encountered as a result of Contractor's operations during the course of work. Include above items into the hazard assessment program specified herein.

1.12 SAFETY MEETINGS

.1 Prior to commencement of work attend health and safety meeting conducted by Departmental Representative. Have Contractor's Site Superintendent in attendance. Departmental Representative will advise of time and location.

.2 Provide site safety orientation session to all workers and other authorized persons prior to granting them access to work site. Brief persons on site conditions and on the minimum site safety rules in force at site.

.3 Conduct site specific occupational health and safety meetings during the entire work as follows:

- .1 Formal meetings on a minimum monthly basis.
- .2 Informal tool box meetings on a regular basis from a predetermined schedule.

.4 Keep workers informed of anticipated hazards, on safety practices and procedures to be followed and of other pertinent safety information related to:

- .1 Progress of Work.
- .2 New sub-trades arriving on site.
- .3 Changes in site and project conditions.

.5 Record and post minutes of meetings. Make copies available to Departmental Representative upon request.

1.13 HEALTH AND SAFETY PLAN

.1 Develop written site-specific Project Health and Safety Plan, based on hazard assessments, prior to commencement of work. Submit plan to Departmental Representative within 7 calendar days of Contract Award date.

.2 Health and Safety Plan shall contain the following three (3) parts:

- .1 Part 1: List of individual health risks and safety hazards identified by hazard assessments.
- .2 Part 2: List of specific measures to control or mitigate each hazard and risk identified in part one of Plan. Describe the engineering controls, personnel protective equipment and safe work practises to be implemented and followed when performing work related to each identified hazard or risk.
- .3 Part 3: Emergency Measures and Communications Procedures as follows:
  - .1 Emergency Measures: on-site operating procedures, evacuation measures and emergency response to be implemented in the occurrence of an incident. Procedures to be specific and relevant to identified hazards. Measures to complement and be integrated with the facility and tenants Emergency Response Plans in place at site:
    - .1 Obtain information on existing emergency and evacuation plans from Departmental Representative and incorporate appropriate data.

.2 Communication Procedures:

.1 List of names and telephone numbers of designated officials, to be contacted should an incident or emergency situation occur, including the following:

.1 General Contractor and all Subcontractors.

.2 Federal and Provincial Departments and local emergency resources organizations, as resources organizations, as applicable laws and regulations.

.3 Officials from Parks Canada. Departmental Representative will provide list of names to be included.

.2 Procedures implemented at site to communicate and share information between workers, subcontractors, and General Contractor on work activities.

.3 Prepare Health and Safety Plan in a three-column format, addressing the three parts specified above, as follows:

Column 1	Column 2	Column 3
Identified	Control	Emergency Measures and Communications
Hazard	Measures	Implemented Procedures

.4 Develop Health and Safety Plan in collaboration with all subcontractors. Address all work and activities of subcontractors as they arrive on site. Immediately update Plan and submit to Departmental Representative.

.5 Implement, maintain and enforce compliance with requirements of the Health and Safety Plan until final completion of work and demobilization from site.

.6 As work progresses, review and update Plan addressing additional health risks and safety hazards identified by on-going hazard assessments.

.7 Submit revised versions of Plan to Departmental Representative.

.8 Post a typed written copy, including all updates, of the Health and Safety Plan in a common visible location at work site.

.9 Submission of the Health and Safety Plan, and updates, to the Departmental Representative is for review and information purposes only. Its submission shall not be construed to imply approval by Departmental Representative, be interpreted as a warranty of being

complete, accurate and legislative compliant and shall not relieve Contractor of his legal obligations for the provision Health and Safety on the construction project.

1.14 SAFETY SUPERVISION AND INSPECTIONS

.1 Employ Health & Safety Site Representative responsible for daily supervision of health and safety of the Work.

.2 Health & Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and will be assigned the responsibility and authority to:

.1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work.

.2 Monitor and enforce Contractor's site-specific Health and Safety Plan.

.3 Conduct site safety orientation session to persons granted access to Work Site.

.4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.

.5 Stop the Work as deemed necessary for reasons of health and safety.

.3 Health & Safety Site Representative must:

.1 Be qualified and competent person in occupational health and safety.

.2 Have site-related working experience specific to activities of the Work.

.3 Be on Work Site at all times during execution of the Work.

.4 All supervisory personnel assigned to the Work must also be competent persons.

.5 Inspections:

.1 Conduct regularly scheduled safety inspections of the Work on a minimum weekly basis. Record deficiencies and remedial action taken.

.2 Conduct Formal Inspections on a minimum monthly basis. Use standardized safety inspection forms. Distribute to subcontractors.

.3 Follow-up and ensure corrective measures are taken.

.6 Keep inspection reports and supervision related documentation on site.

1.15 TRAINING

.1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.

.2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.

.3 When unforeseen or peculiar safety-related hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.16 MINIMUM SITE SAFETY RULES

.1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations, the following safety rules shall be considered minimum requirements at the work site and obeyed by all persons granted access:

.1 Wear personnel protective equipment (PPE) appropriate to function and task on site; the minimum requirements being hard hat, safety footwear (and eye protection where appropriate).

.2 Immediately report unsafe activities, conditions, near-miss accidents, injuries and damages.

.3 Maintain site in tidy condition.

.4 Obey warning signs and safety tags.

.2 Brief workers on site safety rules, and on the disciplinary measures to be taken for violation or non-compliance of such rules. Post such information on site.

1.17 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 will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.18 INCIDENT REPORTING

.1 Investigate and report incidents and accidents as outlined in Provincial Occupational Safety and Health Act and Regulations.

.2 Investigate and immediately report to Departmental Representative incidents and accidents which results, or has the potential of resulting in:

.1 Injuries requiring medical aid.

.2 Property damage in excess of $10,000.00.

.3 Required notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable regulations.

.3 Medical aid in above clause shall have the same meaning as the term "medical aid injury" as defined in the Canadian Dictionary of Safety Terms - 1987 issue, from the Canadian Society of Safety Engineers (C.S.S.E) as follows:

.1 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.4 Submit report in writing.

1.19 TOOLS AND EQUIPMENT SAFETY

.1 Implement and follow a scheduled tool and equipment inspection / maintenance program at work site. Regularly check tools, equipment and machinery for safe operation and

perform maintenance at pre-established time and frequency intervals as recommended by manufacturer. Include subcontractors' equipment as part of the inspection process.

.2 Use standardized checklists to ensure established safety checks are stringently followed.

.3 Immediately tag and remove items found faulty or defective off site.

.4 Maintain written documentation on each inspection. Make available to Departmental Representative upon request.

1.20 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information Systems (WHMIS).

.2 Keep MSDS data sheets on site. Provide copies of all data sheets to Departmental Representative upon receipt of materials on site.

.3 Post all MSDS data sheets on site, in a common area, visible to workers.

.4 On building renovation projects where work is adjacent to occupied areas, locate data sheets in a public location accessible to tenant employees.

1.21 BLASTING

.1 Blasting or other use of explosives is not permitted without prior written instructions from Departmental Representative.

1.22 POWDER ACTUATED DEVICES

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

1.23 POSTING OF DOCUMENTS

.1 Post documents indicated herein and as required by Authority having jurisdiction.

.2 Post other documents as specified herein, including:

.1 Site specific Health and Safety Plan.

.2 WHMIS data sheets.

1.24 RECORDS ON SITE

.1 Maintain on site copy of safety documentation as specified in this section and other safety related reports and documents issued to or received from authorities having jurisdiction.

.2 Make available to Departmental Representative, or authorized safety representative, for inspection upon request.

1.25 BIRDS AND WILDLIFE

.1 Any food or waste that could attract birds or wildlife can only be discarded in properly sealed waste containers.

1.26 RADIO COMMUNICATIONS

.1 When radio communication is required between the Contractor's personnel, all radio equipment shall be supplied by the Contractor.

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 74 11 - Cleaning.

.2 Section 01 74 19 - Waste Management and Disposal.

1.2 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for chemicals and filter media associated with the on-site water treatment system.

.2 Submit 2 copies of WHMIS Safety Data Sheets (SDS).

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.6 Include in Environmental Protection Plan:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including 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.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste Water Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.15 Pesticide treatment plan to be included and updated, as required.

1.4 FIRES

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

1.5 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 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

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

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

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

1.6 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 as indicated.

1.7 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Waterways to be kept free of excavated fill, waste material and debris.

.3 Design and construct temporary crossings to minimize erosion to waterways.

.4 Do not skid logs or construction materials across waterways.

1.8 POLLUTION CONTROL

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

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

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

1.9 HISTORICAL/ARCHAEOLOGICAL CONTROL

.1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.10 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.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 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.

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

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

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19- Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.2 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals.

.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.

1.3 TESTING AGENCIES

.1 Contractor shall engage a third-party materials testing agency for purpose of testing portions of Work as normally required under each Section.

.2 If defects are revealed during inspection and/or testing, agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay for costs of re-testing and re-inspection.

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 Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit 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 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 the opinion of the Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance to the Contract Documents, the Departmental Representative will deduct from the Contract Price the difference in value between the Work performed and that called for by the Contract Documents, the amount which will be determined by the Engineer.

1.7 REPORTS

.1 Submit electronic PDF copies of inspection and test reports to Departmental Representative for review.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

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 TEMPORARY UTILITIES

.1 Contractor shall provide temporary sanitary, water and power utilities as deemed necessary to complete the works.

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 51 00 – Temporary Utilities.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

.2 Indicate use of supplemental or other staging area.

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

.4 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs as required.

1.5 HOISTING

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.

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

1.6 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.

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

1.8 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.

1.9 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide measures for protection and diversion of traffic, including 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 to close off the Work site.

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

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

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

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

.6 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.10 FIRE ROUTES

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

1.11 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

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 Nova Scotia Provincial Department of Environment's "Handbook for Construction Sites", most recent edition.

1.2 EROSION AND SEDIMENTATION CONTROL PLAN

.1 No work on site is to commence until the Contractor has submitted a marked-up site plan and detailed scope indicating the Contractor's plan for protecting the site from erosion and sediment migration and/or concerns during construction.

.2 Plan is to be reviewed by Departmental Representative prior to the start of any work. Allow 5 days for Departmental Representative to review.

1.3 DEFINITIONS

.1 Sediment: soils and other surficial materials transported by surface water as a product of erosion.

.2 Erosion: the process by which the ground surface is worn away by the action of wind and/or water. Detachment of soil particles by erosion agents, principally water, wind, ice and gravity.

.3 Watercourse: any natural or improved stream, river, creek, brook, ditch, channel, canal, conduit, culvert, drain, gully, swale or wash in which waters flow either continuously or intermittently. Same as defined in the Nova Scotia Water Act and in CEPA.

.4 Stripping: any activity which removes or significantly disturbs the vegetative surface cover including clearing, grubbing of stumps and root material and top soil removal.

.5 Site Development: the resulting condition of land improvements through the constructing, installing, placing or planting of open and enclosed storm drainage facilities, storm water management facilities, supporting foundations for utility lines, service connections, parking lots, driveways, curbs, pavements, sidewalks, bike paths, recreational facilities, patios, ground planters, ground covers, plantings, landscaping, tree and/or timber removal.

.6 Benching: a technique of grading or placement of fill to create a series of level benches or steps on a slope. Benches reduce the effective slope length and also serve to entrap sediment.

.7 Berm: a ridge that breaks the continuity of a slope.

.8 Check Dam: a small dam constructed in a gully, ditch or other similar place to decrease water velocity by reducing the channel gradient minimizing scour erosion and promote accumulation of sediment.

.9 Vegetated Buffer Strip: usually a strip of permanent vegetation left beside a stream bank to retard the flow of runoff water that causes deposition of transported materials and to protect the banks. It could also be a vegetative strip, particularly of trees or bushes, left between the construction project and adjacent property.

.10 Deposition: the accumulation of material which settles or is dropped due to slower movement of the transporting agent.

.11 Dispersion Ditch: a ditch or channel that converts a concentrated flow of runoff into sheet flow and outlets it onto areas stabilized by existing vegetation thus helping to prevent erosion.

.12 Filter Fabric: a synthetic material of woven or non-woven plastic description. Its purpose is to allow water to filter through while retaining fine soil particles and preventing them from being washed away.

.13 Land-disturbing Activity: any land change which may result in soil erosion, including but not limited to clearing grubbing, grading, excavating, transporting and filling of land.

.14 Ponding: of water shall not be permitted particularly above cut or fill slopes or on drainage terraces nor shall water be impounded on adjacent property. Adequate drainage facilities shall be provided to prevent such ponding.

.15 Rilling: a small channel not more than 30 centimetres (1 foot) deep, cut into the surface of the soil by runoff.

.16 Drainage: the removal of excess surface water or ground water from land by means of surface or subsurface drains. Soil characteristics that affect natural drainage.

.17 Erodible: susceptible to erosion.

.18 Erosive: having sufficient velocity to cause erosion. Refers to wind or water. Not to be confused with "erodible" as a quality of soil.

.19 Gradient: change of elevation per unit length; slope.

.20 Gullying: erosion of soil caused by concentrated runoff which forms a deeply-cut channel in the land surface.

.21 Rip Rap: large rock, cobbles, or boulders placed on earthen surfaces for protection of the soil against the erosive action of water.

.22 Run-off: the portion of precipitation on a drainage area that is not absorbed into the ground but is discharged into streams. Components of runoff include overland flow (sheet flow) and open channel flow.

.23 Scouring: erosion of the bed or banks of a channel, usually localized around an obstruction or structure in a channel or at the outlet of a conduit due to an increase in the water velocity around the obstruction our discharging from the conduit.

.24 Stabilization: the process of establishing an enduring soil cover of vegetation and/or mulch or other ground cover in combination with installing temporary or permanent structures for the purposes of minimizing soil erosion.

.25 Soil permeability: the ability of soil to allow water or air to move through it.

1.4 GENERAL

.1 Submit to Departmental Representative for approval and prior to any work commencing an Erosion and Sedimentation Control Plan for the Construction site. Allow 5 working days for Departmental Representative to review and approve.

.2 All items identified for installation to be maintained by the Contractor for the duration of the project and until Departmental Representative authorizes removal.

.3 Preserve all features of natural channels or watercourses.

.4 Protect all areas in close proximity to flood plains, or subject to flooding, from silt prior to any work commencing.

.5 Divert clean runoff away from exposed areas to minimize the production of sediment-laden runoff.

.6 Construct in phases. Expose only the smallest practical area of land for the shortest possible time required to perform the Work of the Contract.

.7 Schedule phases of construction so that only the areas which are actively being developed are exposed. Schedule to be approved by Departmental Representative prior to the start of any Work.

.8 Complete grading as soon as possible.

.9 Immediately after grading is complete establish permanent vegetation and surface cover, and erosion controls in the area of construction.

.10 Revegetate slopes as work progresses.

.11 Minimize grading of large or critical areas during the season of maximum erosion potential.

.12 Keep soils covered as much as possible with temporary or permanent vegetation or with various mulch material.

.13 Slopes to be roughened parallel to the contour or tracked with a cleated dozer.

.14 Tracked vehicles to have street pads to protect paved surfaces.

.15 Roll and compact soils to make it less erodible.

.16 Capture and filter all surface run-off from exposed soils.

.17 Prevent gross erosion in the form of gullies.

.18 Silt and sedimentation control measures shall be installed before beginning any work. Controls to be maintained regularly to ensure intended results.

.19 Filter run-off as it flows through an area or impound the sediment laden runoff for a period of time to allow settling of particulates. Sediment to be cleaned up and disposed of where approved by the Departmental Representative as soon as practical or when directed by Departmental Representative.

.20 Provide berms, sedimentation basins, traps and vegetative or screen filters to control sediments.

.21 Prevent erosion at the source.

1.5 PROTECTION

.1 Work is not to proceed on the construction site until the sequence of construction has been decided on for all phases, the timing of work, the planning and provision of sedimentation controls are in place and the monitoring of controls and timings are approved by the Departmental Representative.

.2 Perform a routine end of the day check to ensure all control practices are properly installed and in working order.

.3 Check weather forecast daily and inspect and repair measures before a forecast rain event.

.4 Maintain an adequate inventory on-hand of materials such as straw bales, polyethylene, gravel, rip rap, filter fabric, silt screen and stakes. Know where straw, hay, mulch (bark or sawdust) is readily available.

.5 Replace hay or straw bales used for controls after each rainfall. Bales to be monitored during periods of heavy precipitation and replaced as required. Bales are not an acceptable control during freeze periods of the year.

.6 Identify and protect catch basins or storm water receptors from being contaminated with sedimentation in areas of work and in a manner and schedule as approved by Departmental Representative.

1.6 GRADING

.1 Complete grading work as soon as possible and stabilize the bare earth by mulching seeding to grasses or compacted gravels.

.2 Keep cuts and fills on as flat a slope as possible. If the slope is steeper than 2:1 (H:V), consider retaining wall or cribbing.

.3 In erodible soils lower cuts and fills of 3:1 or 4:1 to be used. In all cases, round the top and toe of the slope to blend into existing grades of existing ground.

.4 Place fills so that there is no danger of sliding or washing onto adjoining property or into watercourses.

.5 Do not locate fill stockpiles adjacent to a stream bank unless protected with fabric filters and rip rap. Stockpile locations and method of controls to be approved by Departmental Representative.

.6 Fill stockpiles to be used up as soon as practical during the phases of work and storage areas are to be cleaned up as soon as they are no longer required to perform the work.

.7 Seeps, water table or springs encountered during construction to be reported to Departmental Representative when encountered and to have proper drainage controls determined and installed.

.8 During grading operations, exercise the necessary measures for dust control.

.9 Regrade if serious gullying or rilling of the surfaces have occurred before a vegetative cover begins to establish.

1.7 FILTER FABRIC BARRIER

.1 This type of barrier to be considered as temporary. Filter fabric barrier is more commonly referred to as a ‘silt fence’. Use to be limited to situations in which only sheet or overland flows are expected or there is that possibility during any phases of construction.

.2 Filter barriers are not to be used in a natural watercourse.

.3 These barriers are not effective when continuous flow and/or moderate to high velocities can be expected.

.4 This barrier to be used to surround a disturbed work site, where it should be installed up-slope from the area to be protected in order to prevent silt from being conveyed to an adjacent property or watercourse.

.5 Filter fabric barriers shall be cleaned out at regular intervals as be determined in consultation with Departmental Representative prior to Contract commencing and specifically after each rainfall to maintain effectiveness.

.6 Filter barriers to be located so they are protected from damage by heavy equipment operating at the Work Site.

.7 If the barrier is to be constructed across a wide ditch or swale carrying low flow, ensure that the ends of the filter are keyed-in to the sides of the ditch to prevent end flow. If the side slopes of the ditch are steep, regrade to a more stable slope.

.8 For silt fence installation:

i. excavate a 100 mm wide x 100 mm deep trench in a crescent shape across the flow path with ends pointing up slope.
ii. set wood stakes 50 mm square spaced 1 meter apart, securely into the ground along the downslope side of the trench.
iii. install the filter fabric, cutting it to the desired length and in the longest practical continuous piece as possible to avoid seams. All seamed areas to be overlapped by at least two stakes in and backed with straw bales.
iv. staple the filter fabric to the upstream side of the stakes extending the bottom 200 mm into the trench.
v. the filter fabric not to exceed 900 mm in height.
vi. backfill using excavated trench materials and compact the soil in the trench over the bottom of the filter fabric.

.14 Clean out accumulated sediment at regular intervals and after severe rainstorms and promptly repair the barrier if undercutting or end flow has occurred. Disposal of silt and sedimentation shall be at the direction of the Departmental Representative.

.15 Remove the barrier once construction work has been completed and the area is stabilized with vegetation or hard cover. In areas of vegetation under growth maintain barriers until growth has been re-established to Departmental Representative's approval. Remove and dispose of collected sediment in manner approved by Departmental Representative.

1.8 STRAW FILTER BARRIERS

.1 Do not use straw barriers in a natural watercourse.

.2 Straw filters are to be considered only as short-term measures and are to be used when treating runoff from very small drainage areas for a short period of time.

.3 Straw barriers to be used when normal flows are minimal or where conditions exist for runoff from infrequent, high-intensity rainfall, in shallow ditches or swales, along the side of waterways or along property boundaries during construction and in drainage areas less than 1 hectare in size.

.4 Clean out, repair and replace regularly and after each rain to maintain effectiveness.

.5 Straw barriers are designed to allow water to flow through not over the barrier.

.6 Straw barriers plug up with sediment very quickly and require constant surveillance and close attention to maintenance. If the bales are not replaced when plugged with sediment, a rock apron must be constructed on the downslope side of the barrier. The maximum life is approximately 3 months or considerably less under wetter conditions and successive storms. Departmental Representative to determine replacement frequency based on weather and sediment frequency run off for site.

.7 If a straw barrier is to be installed in a ditch or swale and the side slopes of the ditch are steep, regrade to a more stable slope. Excavate the sides of the ditch to allow the bales to be keyed in.

.8 For straw barrier installation:

i. Excavate the trench the width of a straw bale and the length of the barrier to a minimum depth of 150 mm below the existing grade surface.
ii. place the straw bales on their sides and tightly together in the trench. If the bales have been tied with non-degradable twine they should be placed on the flat.
iii. drive two sturdy wooden or steel stakes through each bale, deep enough to anchor them securely. Drive the first stake in each bale toward the previously laid bale to force the bales together.
iv. wedge loose straw between any cracks or other openings and scatter loose straw over the soil on the uphill side of the barrier. Subsequent movement of the loose straw tends to seal any undetected openings in the barrier.
v. backfill and lightly compact the excavated soil up to a depth of 100 mm against the up-slope side of the barrier.
vi. backfill and compact the excavated soil to ground level on the downslope side.
vii. excavate a sediment trap on the up-slope side of the barrier.

.9 Check barrier regularly and replace as necessary and as approved by Departmental Representative after each rainstorm.

.10 Remove the silt from the upside slope of the barrier and dispose in a location and manner approved by the Departmental Representative.

.11 Remove and dispose of straw barrier at completion of Work of the Contract and after possibility of erosion or sediment is eliminated.

1.9 EXCAVATIONS

.1 When excavating a trench place the excavated material on the side of the trench where the grade is sloping toward the trench.

.2 Protect ends of trench with barriers in areas where gradient runs away from trench area.

.3 Where utility cuts across roadways or paved surfaces the Contractor is to clean-up all sedimentation on road surfaces and or in areas where sedimentation is created as a result of exposed ground from the Work of the contract immediately following precipitation such as snow or rainfall.

.4 During precipitation the Contractor to place straw bales at intervals along the gutter areas of roads in selected locations and at least 3 metres of spacing prior to a catch basin and up gradient of the flow to minimize silt from entering storm water catch basins and or watercourses.

.5 Where sedimentation is being created from exposed ground as a result of the Work the Contractor is to immediately provide a fabric barrier along the edge of roadways to prevent silt from being carried to storm water systems.

.6 At the end of the contract Catch basins considered by the Departmental Representative to be contaminated with sedimentation as a result of the Work of the Contract to be cleaned out and the lines between the catch basin to be flushed by the Contractor to the satisfaction of the Departmental Representative.

.7 Disposal of sedimentation collected from the storm water system to be disposed of at location and manner as directed by Departmental Representative. This disposal can be mixed with landscaping topsoil provided it is clean of deleterious items.

1.10 CHECK DAMS

.1 The use and type of check dams to be determined by the Departmental Representative prior to the commencement of the project where possible.

.2 The purpose of check dams commonly referred to sediment or silt traps is to prevent erosion of gully or ditch bottoms: by slowing velocity of concentrated runoff; by collecting and holding moisture and soil in the bottom of gullies, thereby facilitating the establishment of stabilizing vegetation; to trap small amounts of sediment by reducing velocity and to prevent silt caused by sheet and rill erosion from being deposited on lands downstream from those being developed.

.3 Check dams are not to be used in watercourses and are only for ditches carrying storm drainage.

.4 Permanent Check dams to be constructed in accordance with the "Handbook for Construction Sites" and/or as detailed in the drawings. Permanent check dams can be used in gully bottoms where channel gradient is too steep for a vegetative lining alone and where the channel is too large for practical installation of structural linings. Permanent check dams can consist of the following types:

.1 Rock dams;
.2 Gabion Dams;
.3 Plank or Slab Dams;
.4 Sodded Earth Fill dams;
.5 Sandbag Dams;
.6 Straw Bale dams;
.7 Filter Fabric dams.

.5 Temporary check dams consist of rock dams, sandbag dams and brush damns and are primarily constructed to avoid wash-outs.

1.11 DIVERSION DITCHES

.1 Diversion ditches apply to overland runoff. Diversion of a natural watercourse is not permitted.

.2 The purpose of a diversion ditch is to reduce slope lengths; to break up concentration of runoff; to move water to stable outlets at the non-erosive velocity; to divert water away from cut or fill slopes, steeply sloping land, construction sites, buildings and residences, active gullies or other erodible areas; and low-lying areas in order to prevent flooding. The diversion ditch is also used to convey silted runoff to a vegetated area to disperse flow and filter silt.

.3 Diversion ditches to be used with caution on soils subject to slippage and or erosion and only when approved by Departmental Representative.

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 77 00 – Closeout Procedures.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily 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 Dispose of waste materials and debris at approved facilities.

.6 Clean interior areas prior to start of finishing work and maintain areas free of dust and other contaminants during finishing operations.

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

.8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly constructed surfaces.

1.3 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 and leave Work clean and suitable for occupancy.

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

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

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

.6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.7 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.8 Remove dirt and other disfiguration from exterior surfaces.

.9 Sweep and wash clean paved areas.

.10 Clean equipment and fixtures to sanitary condition.

.11 Clean roofs, downspouts, and drainage systems.

.12 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

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 33 00 – Submittal Procedures.

.2 Section 01 74 11 - Cleaning

1.2 REFERENCES

.1 Definitions:

.1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority.

.2 Approved disposal area: Disposal area as designated by the Departmental Representative.

.3 Class III: non-hazardous waste - construction renovation and demolition waste.

.4 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities.

.5 Inert Fill: inert waste - exclusively asphalt and concrete.

.6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.10 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.11 Separate Condition: refers to waste sorted into individual types.

.12 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Prepare and submit on monthly basis, throughout project or at intervals agreed to by Departmental Representative the following:

.1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.

.2 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.

.3 Submit prior to final payment the following:

.1 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.4 USE OF SITE AND FACILITIES

.1 Execute Work with minimal interference and disturbance to normal use of premises.

.2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.5 WASTE PROCESSING SITES

.1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.6 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations so as to not interfere with Work.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to designated disposal facility.

.5 Protect structural components not removed and salvaged materials from movement or damage.

.6 Protect surface drainage, mechanical and electrical from damage and blockage.

.7 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.8 Separate and store materials produced during project in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.

.3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

.4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.7 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste type into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Total tonnage generated.

.4 Tonnage reused or recycled.

.5 Reused or recycled waste destination.

.4 Remove materials on-site as Work progresses.

1.8 SCHEDULING

.1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 APPLICATION

.1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

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

.1 Leave Work area clean at end of each day.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 78 00 – Closeout Submittals.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: conduct 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 submit verification that corrections have been made.

.2 Request Departmental Representative's inspection.

.2 Departmental Representative's Inspection:

.1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted, balanced and fully operational.

.4 Operation of systems: demonstrated to Departmental Representative's personnel.

.5 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.

.2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

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

.7 Final Payment:

.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.2 When Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

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

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 77 00 – Closeout Procedures.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 FORMAT

.1 Organize data as instructional manual.

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

.3 When multiple binders are used correlate data into related consistent groupings.

.1 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.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide CAD files in .dwg format on CD or memory stick.

.10 Provide PDF format of Binders, one volume per PDF file, bookmark each separate product and system with description of product and major component parts of equipment.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties.

.3 Schedule of products and systems, 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 identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, at site for Departmental Representative one record copy of:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to 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 apart from documents used for construction.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

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

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line drawings, and in copy of Project Manual.

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

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Record information in AutoCAD .dwg files.

.5 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.6 Specifications: 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 Addenda and change orders.

.7 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.8 Provide digital photos, if requested, for site records.

1.7 FINAL SURVEY

.1 Submit final site survey certificate certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

.1 Prepare a complete in-trench survey for all utilities.

.2 Prepare a complete as-built topographical survey to capture all surface features.

.2 Locate all roadways, pads, buildings, trees, shrubs, flag poles, bollards, posts, abandoned utilities, capped utilities and new utilities within the construction area.

.3 Locate sewer manholes, water valve chambers and catchbasins c/w inverts indicated by north, south, east, west location.

.4 Locate electrical manholes, poles, transformers, switching cubicles and specialty lights.

.5 Survey to be completed by a Construction Surveyor and be a registered Nova Scotia Land Surveyor.

.6 Provide survey on CD or memory stick in AutoCAD .dwg format along with .csv or ASCII file of raw data points.

1.8 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan to Departmental Representative.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.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 applicable item of work.

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

.5 Co-execute submittals when required.

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

.6 Respond in timely manner to oral or written notification of required construction warranty repair work.

.7 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.9 DELIVERY SCHEDULE

.1 Accompany Record Information submissions with a transmittal containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Other pertinent data.

.2 Within three weeks of substantial completion, or as otherwise agreed, the Contractor shall deliver the Record Information package with the data required as identified herein.

.1 Allow ten working days for the Departmental Representative's or Departmental Representative's review of each submission.

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 03 20 00 - Concrete Reinforcing.

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-A23.1-09/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-O86-14, Engineering Design in Wood.

.3 CSA O121-08, Douglas Fir Plywood.

.4 CSA O151-09, Canadian Softwood Plywood.

.5 CSA O153-13, Poplar Plywood.

.6 CAN/CSA-O325-07, Construction Sheathing.

.7 CAN/CSA-S269.3-M92, Concrete Formwork, National Standard of Canada.

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit shop drawings for formwork and falsework.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Nova Scotia, Canada.

.3 Submit WHMIS MSDS - Material Safety Data Sheets for form release agents or any other chemicals to be used as part of the Work.

.4 Co-ordinate submittal requirements.

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

.6 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

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

.8 When slip forming or flying forms are used, submit details of equipment and procedures for review by Departmental Representative.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with manufacturer's recommendations.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

- .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86 or CSA-O153, as directed by formwork engineer.
- .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
- .3 Rigid insulation board: to CAN/ULC-S701.

.2 Tubular column forms: round, spirally wound laminated fibre forms, internally treated with release material.

- .1 Spiral pattern not to show in hardened concrete.

.3 Form ties:

- .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:

- .1 Plywood: Douglas Fir to CSA O121, Canadian Softwood Plywood to CSA O151 or Poplar to CSA O153, as specified by formwork engineer.
- .2 Waferboard: to CAN/CSA-O325.0, as specified by formwork engineer.

.5 Form release agent: non-toxic, biodegradable, low VOC.

.6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.7 Falsework materials: to CSA-S269.1.

.8 Sealant: to Section 07 92 00 - Joint Sealants.

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 Earth forms are not permitted.

.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.

.1 Keep form joints to a minimum.

.7 Use 25 mm chamfer strips on all external corners and/or 25 mm fillets at all interior corners, joints, unless specified otherwise.

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

.9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes.

.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 3 days for walls and sides of beams.

.2 2 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, where required. Contractor to pay for testing of concrete for removal of formwork prior to the timeframes listed above.

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

.4 Space reshoring in each principal direction at not more than 3 meters.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

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

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Measure reinforcing steel in kilograms of steel incorporated into Work, computed from theoretical unit mass specified in CSA-G30.18 for lengths and sizes of bars as indicated.

1.3 REFERENCES

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.2 ASTM International

.1 ASTM A1064/A1064M-15, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.2 ASTM A143/A143M-14, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.4 ASTM A775/A775M-14, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.3 CSA International

.1 CSA-A23.1-14/A23.2-14, 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-G30.18-14, Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CSA W186-M1990, Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Nova Scotia, Canada.

.1 Indicate placing of reinforcement and:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.

.2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

.1 Provide Class B Tension lap splices unless otherwise indicated.

1.5 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.

.1 Mill Test Report: Provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 2 weeks prior to beginning reinforcing work.

.2 Submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 and in accordance with manufacturer's recommendations in a clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A1064/A1064M.

.5 Deformed steel wire for concrete reinforcement: to ASTM A1064/A1064M.

.6 Welded steel wire fabric: to ASTM A1064/A1064M.

.1 Provide in flat sheets only.

.7 Welded deformed steel wire fabric: to ASTM A1064/A1064M.

.1 Provide in flat sheets only.

.8 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.

.9 Galvanizing of non-prestressed reinforcement: to ASTM A123/A123M, minimum zinc coating 610 g/m2.

.1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.

.2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

.1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.

.3 If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.

.1 In this case, no restriction applies to temperature of solution.

.4 Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.

.1 Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.10 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.11 Mechanical splices: subject to approval of Departmental Representative.

.12 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

.1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

2.3 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to beginning reinforcing work.

.2 Inform Departmental Representative of proposed source of material to be supplied.

Part 3 Execution

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placement drawings and in accordance with CSA-A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

.2 When paint is dry, apply thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.4 Ensure cover to reinforcement is maintained during concrete placement.

.5 Protect epoxy coated portions of bars with covering during transportation and handling.

3.4 FIELD TOUCH-UP

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 03 20 00 - Concrete Reinforcing.

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Measurement Procedures: in accordance with Section 01 29 00 - Payment Procedures.

.2 Measure cast-in-place concrete in cubic metres calculated from neat dimensions as indicated.

.1 Concrete placed beyond dimensions indicated will not be measured.

.3 No deductions will be made for volume of concrete displaced by reinforcing steel, structural steel, or piles.

.4 No deductions will be made for volume of concrete less than 0.1 m2 in cross sectional area displaced by individual drainage openings.

.5 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.

1.3 REFERENCES

.1 Abbreviations and Acronyms:

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.

.1 Type GU, GUb and GUL - General use cement.

.2 Type MS and MSb - Moderate sulphate-resistant cement.

.3 Type MH, MHb and MHL - Moderate heat of hydration cement.

.4 Type HE, HEb and HEL - High early-strength cement.

.5 Type LH, LHb and LHL - Low heat of hydration cement.

.6 Type HS and HSb - High sulphate-resistant cement.

.2 Fly ash:

.1 Type F - with CaO content less than 15%.

.2 Type CI - with CaO content ranging from 15 to 20%.

.3 Type CH - with CaO greater than 20%.

.3 GGBFS - Ground, granulated blast-furnace slag.

.2 Reference Standards:

.1 ASTM International

.1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-15a, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.5 ASTM D412-15a, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.6 ASTM D624-12, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.7 ASTM D1751-13, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.8 ASTM D1752-13a, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 CSA International

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

.2 CSA A283-16, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 At least 3 weeks prior to beginning Work, provide Departmental Representative with data sheets for the materials proposed for use as follows:

.1 curing compound.

.2 joint filler.

.3 waterstops.

.4 supplementary cementing material.

.5 blended hydraulic cement.

.6 admixture.

.7 each fine and coarse aggregate.

.3 Provide testing results for review by Departmental Representative for the mix design and do not proceed without written approval when deviations from mix design or parameters are found.

.4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.5 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

.6 Provide one copy of WHMIS MSDS for all chemicals used for the Work.

1.5 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Provide Departmental Representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.3 Minimum 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:

.1 Falsework/formwork erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

Part 2 Products

2.1 DESIGN CRITERIA

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

2.2 PERFORMANCE CRITERIA

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by contract documents and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

.1 Portland Cement: to CSA A3001

.2 Blended hydraulic cement: to CSA A3001.

.3 Supplementary cementing materials: to CSA A23.1.

.4 Water: to CSA A23.1.

.5 Aggregates: to CSA A23.1/A23.2.

.6 Admixtures:

- .1 Air entraining admixture: to ASTM C260.
- .2 Chemical admixture: to ASTM C494 and ASTM C1017, depending on time of placement.
- .3 Corrosion-inhibiting admixture: to CSA A23.1/A23.2.
- .4 Lithium-based admixture: to CSA A23.1/A23.2.
- .5 Shrinkage-reducing admixture (SRA): to CSA A23.1/A23.2.
- .6 Viscosity-modifying agent (VMA): to CSA A23.1/A23.2.

.7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents to CSA A23.1/A23.2.

- .1 Compressive strength: 30 MPa at 28 days.
- .2 Net shrinkage at 28 days: maximum .030 %.

.8 Non premixed dry pack grout: composition of non-metallic aggregate cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.9 Post-Tensioning Ducts: to CSA A23.1/A23.2.

.10 Curing compound: to CSA A23.1/A23.2 and ASTM C309.

.11 Premoulded joint fillers:

- .1 Bituminous impregnated fiber board: to ASTM D1751.
- .2 Sponge rubber: to ASTM D1752, Type I, flexible.

.12 Weep hole tubes: plastic.

.13 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.

.14 Dampproof membrane:

- .1 Polyethylene membrane:
  - .1 Plain: 15mil thick polyethylene film.
  - .2 Membrane adhesive: as recommended by membrane manufacturer.

.15 Dampproofing:

.1 Emulsified asphalt, mineral colloid type, unfilled: to ASTM D997.

2.4 MIXES

.1 Proportion normal density concrete in accordance with CSA A23.1/A23.2;

.1 Use: Footings

.1 Exposure Classification: N

.2 Cement: Type Gu

.3 Compressive Strength: minimum 30MPa at 28 days

.4 Air content: non air entrained 0-3%

.5 Slump at Discharge: 80+/-30mm without the use of superplasticizer, 150+/-30mm with the use of superplacticizer

.6 Curing: Type 1, minimum 10 Degree C for minimum 3 days

.7 Maximum Aggregate size: 20mm.

.2 Use: Exterior Walls and Pilasters

.1 Exposure Classification: F-1

.2 Cement: Type Gu

.3 Compressive Strength: minimum 30MPa at 28 days

.4 Air Content: 4-7%

.5 Slump at Discharge: 80+/-30mm without the use of superplasticizer, 150+/-30mm with the use of superplasticizer

.6 Curing: Type 2 for vertical surfaces (forms remain in place), 7 days total at ≥ 10 °C and for the time necessary to attain 70% of the specified strength.

.7 Maximum Aggregate Size: 20mm

.3 Use: Floor Slabs on Grade.

.1 Exposure Classification: C-1

.2 Cement: Type GubF/SF

.3 Compressive Strength: minimum 35MPa at 56 days

.4 Air Content: 5-8%

.5 Slump at Discharge: 80+/-30mm without the use of superplasticizer, 150+/-30mm with the use of superplasticizer

.6 Curing: Type 3 for horizontal surfaces, a wet-curing period of 7 d at ≥ 10 °C and for the time necessary to attain 70% of the specified strength.

.7 Curing types allowed are ponding, continuous sprinkling, absorptive mat, or fabric kept continuously wet.

.4 Chemical admixtures: admixtures in accordance with ASTM C494.

.1 All mixes above to incorporate Krystol Internal Membrane (KIM) (by Kryton) integrated permeability reducing admixture. Mix ratios for the waterproofing admixture shall be in accordance with manufacturer's recommendations.

.5 Mix design to be based on trial mixes designed and tested by a qualified Professional Engineer licensed to practice in the Province of Nova Scotia.

Mix design to be submitted and reviewed by Owner's Representative prior to usage.

Part 3 Execution

3.1 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.

.1 Provide 24 hours minimum notice prior to placing of concrete.

.2 Coordinate placement with Testing Laboratory.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete is permitted only after approval of equipment and mix (by concrete supplier).

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

.6 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.7 Clean and remove stains prior to application for concrete finishes.

.8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.9 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.

.1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in position, as indicated.

.10 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Sleeves and inserts:

.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated on contract documents.

.2 Set sleeves, ties, pipe hangers and other inserts and openings as indicated.

.3 Sleeves and openings greater than 100 x 100 mm not indicated on documents, must be reviewed by Departmental Representative.

.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications before placing of concrete.

.5 Confirm locations and sizes of sleeves and openings shown on drawings.

.3 Anchor bolts:

.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.

.2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.

.1 Drilled holes: to manufacturers' recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-up.

.4 Set bolts and fill holes with epoxy grout.

.4 Drainage holes and weep holes:

.1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.

.2 Install weep hole tubes and drains as indicated.

.5 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.6 Finishing and curing:

.1 Finish concrete to CSA A23.1/A23.2.

.2 Contractor to pay special attention to curing of walls and slabs to ensure that microcracking does not occur as a result of hydration. Crack control joints to be placed at a spacing not exceeding 4500mm, interior and exterior, and sealed with joint compound.

.3 Use curing compounds compatible with applied finish on concrete surfaces.

.4 Finish concrete floor to CSA A23.1/A23.2. Class A – Conventional Slab-on-Grade.

.5 Concrete floor to have finish hardness equal to or greater than 6 Mohs hardness to CSA A23.1/A23.2.

.6 Provide screed float trowelled finish unless otherwise indicated.

.7 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

.7 Joint fillers:

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.

.2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.3 Locate and form construction/expansion joints, as indicated.

.4 Install joint filler.

.5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.8 Dampproof membrane:

.1 Install dampproof membrane under concrete slabs-on-grade inside building.

.2 Lap dampproof membrane minimum 150 mm at joints and seal.

.3 Seal punctures in dampproof membrane before placing concrete.

.4 Use patching material at least 150 mm larger than puncture and seal.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance to CSA A23.1 FF = 25: FL = 17.

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7, 28 and 56 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Departmental Representative will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

.4 Testing Laboratory will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.6 Inspection or testing by Departmental Representative or Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all plumbing fixtures and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate on drawings:

.1 Operating and maintenance clearances.

.2 Shop drawings and product data accompanied by:

.1 Manufacturer to certify current model production.

.2 Certification of compliance to applicable codes.

1.2 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for plumbing fixtures for incorporation into manual.

.1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.

.2 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.3 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.4 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.5 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.6 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.7 As-built drawings:

.1 Finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.3 MAINTENANCE MATERIAL SUBMITTALS

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

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect all plumbing fixtures from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 NOT USED

.1 Not used.

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 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 CLEANING

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

.1 Leave Work area clean at end of each day.

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

3.3 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International Inc.

.1 ASTM B88M-14, Standard Specification for Seamless Copper Water Tube (Metric).

.2 National Research Council (NRC)/Institute for Research in Construction

.1 NRCC 38728, National Plumbing Code of Canada (NPC) - 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

Part 2 Products

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Below ground connection to site water supply: Copper tubing: to ASTM B 88, type K annealed, minimum pressure rating of 1,035 kPa.

2.2 FITTINGS

.1 Not permitted

2.3 JOINTS

.1 Compression type, minimum pressure rating of 1035 kPa.

.2 At building curb stop only. No other joints permitted.

Part 3 Execution

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with NPC and local authority having jurisdiction.

.2 Piping system will only be operational in summer. Piping shall be installed with slope that allows 100% drainage to permit winterization of the buildings.

.3 Assemble piping using fittings manufactured to ANSI standards.

3.3 FLUSHING AND CLEANING

.1 Coordinate with civil contractor.

3.4 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Departmental Representative.

.2 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

3.5 PERFORMANCE VERIFICATION

.1 Verify that system can be completely drained.

.2 Reports:

.1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

3.6 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International Inc.

.1 ASTM D2235-11, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

.2 ASTM D2564-2012, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-Series B1800-06, Thermoplastic Non-pressure Pipe Compendium - B1800 Series.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 - Occupational Health and Safety (OH&S) Requirements.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with manufacturer’s written instructions.

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

.3 Store at temperatures and conditions recommended by manufacturer.

.4 Packaging Waste Management: remove for recycling all packaging materials in accordance with Section 01 00 00 – General Instructions, Part 15.

Part 2 Products

2.1 PIPING AND FITTINGS

.1 For buried and above ground DWV piping to:

.1 CAN/CSA B1800.

2.2 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

Part 3 Execution

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code.

3.3 TESTING

.1 Hydraulically test to verify grades and freedom from obstructions.

3.4 PERFORMANCE VERIFICATION

.1 Cleanouts:

.1 Open, cover with linseed oil and re-seal.

.2 Verify cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

3.5 CLEANING

.1 Clean in accordance with Section 01 74 11- Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA International

.1 CSA B79-2013, Commercial and Residential Drains and Cleanouts.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit in pdf format manufacturer's instructions, printed product literature and data sheets for plumbing products and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:

.1 Submit shop drawings in pdf format.

.2 Indicate on drawings to indicate materials, finishes, method of anchorage, dimensions construction and assembly details accessories for following: trap primers, floor drains, cleanouts.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for plumbing specialties and accessories for incorporation into manual.

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect plumbing materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for recycling all packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 FLOOR DRAINS

.1 Floor Drains: to CSA B79.

.2 FD-1: general duty; cast iron body round, adjustable head, sediment basket nickel bronze strainer, integral seepage pan, and clamping collar.

.3 FFD-1: combination funnel floor drain; cast iron body with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral funnel.

2.2 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Access Covers:

.1 Floor Access: round cast iron body and frame with adjustable secured nickel bronze top and:

.1 Plugs: bolted bronze with neoprene gasket.

.2 Cover for Unfinished Concrete Floors: nickel bronze round square, gasket, vandal-proof screws.

.3 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.

2.3 TRAP SEAL PRIMER PIPING

.1 Material: Copper tubing: to ASTM B 88, type K annealed, minimum pressure rating of 1,035 kPa.

.2 Joint: To suit floor drain connection

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 plumbing specialities and accessories 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 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada.

.2 Install in accordance with manufacturer's instructions and as specified.

3.4 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4.

3.5 TRAP SEAL PRIMERS

.1 Install for floor drains and elsewhere, as indicated.

.2 Install soft copper tubing to floor drain, trap.

3.6 TESTING AND ADJUSTING

.1 Cleanouts:

.1 Verify covers are gas-tight, secure, yet readily removable.

3.7 CLEANING

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

.1 Leave Work area clean at end of each day.

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

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

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

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Requirements.

.3 Section 01 61 00 - Product Requirements.

.4 Section 01 70 00 - Contract Closeout.

.5 Section 01 74 11 - Cleaning.

.6 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.7 Section 01 78 00 - Closeout Submittals.

.8 Section 06 10 00 - Rough Carpentry.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 CSA Group

.1 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.1 Institute of Electrical and Electronics Engineers (IEEE)/National Electrical Safety Code Product Line (NESC).

.1 IEEE SP1122, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit in accordance with the following sections unless superseded by more stringent specifications included elsewhere.

.3 Submit for review single line electrical diagrams.

.1 Electrical distribution systems.

.4 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit:

.1 Functional description of equipment.

.2 Technical data for all devices.

.3 Device location plans and cable lists.

.4 Devices mounting location detail drawings.

.5 Typical devices connection detail drawings.

.5 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit two copies of 24 in. x 24 in. (600 mm x 600 mm) minimum size drawings to inspection authorities.

.6 If changes are required, notify Departmental Representative of these changes before they are made.

.6 Certificates:

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment or material is not available, submit such equipment or 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.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.7 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing.

1.5 CLOSEOUT SUBMITTALS

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

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

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Single line electrical diagrams for each electrical distribution system.

.3 Description of system operation.

.4 Description of each subsystem operation.

.5 Operation instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.6 List showing each piece of equipment in system or subsystem by its original manufacturer name and model number.

.7 Part list showing parts used in equipment by identification numbers that are standard to electronics industry.

.8 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.9 Post instructions where directed by departmental representative.

.10 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.11 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

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

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.4 As-Built Record Drawings.

.1 General:

.1 The Contractor shall keep an accurate record of as-built conditions. Record any variations from the contract documents, showing all changes made on site, including but not limited to, actual dimensions, elevations, inverts, sizes and other description notations.

.2 Hard copy submission:

.1 Hard copies to be submitted in conjunction with required electronic files.

.2 All as-built drawings are to be prints of the electronic version and are to be identical to the CAD drawings. All electronic copies of as built record drawings are to bear the electronic seal of the designer as per the hard copy.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 indoors in dry location and in accordance with manufacturer's recommendations in clean, well-ventilated area.

.2 Store and protect from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return of pallets, crates, packaging materials.

Part 2 Products

2.1 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 and labels for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material and equipment to be CSA certified. Where CSA certified equipment or material is not available, submit such equipment or material to inspection authorities for special approval before delivery to site as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment, and controls, as indicated.

.2 Verify coordination of overload and overcurrent protective devices for coordination as required by the Canadian Electrical Code (CSA22.1-2015) rule 38-062.

.3 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections or as shown on mechanical drawings.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of CSA C22.1, the authority having jurisdiction and the Departmental Representative.

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

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

.1 All switchboards, panels, disconnect switches, power/voice/data/ outlets, transformers, control panels, and motor starters are to be provided with lamicoid nameplates. Nameplates shall be affixed true and level, and plumb in all instances.

.2 Identify electrical equipment with nameplates as follows:

.1 Nameplates: lamicoid, matt white finish face, black core, mechanically attached with self tapping screws lettering accurately aligned and engraved into core.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.3 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.4 Wording on nameplates to be approved by Departmental Representative prior to manufacture.

.5 Allow for minimum of twenty-five (25) letters per nameplate.

.6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.7 Terminal cabinets and pull boxes: indicate system and voltage.

.8 Transformers: indicate capacity, primary and secondary voltages.

2.7 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.

2.8 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of ‘equipment green’ finish enamel.

Part 3 Execution

3.1 ADMINISTRATION

.1 Obtain and pay for all necessary permits required to perform the work. Comply with all permit requirements and conditions.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 EXAMINATION

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

.1 Visually inspect substrate in presence of the 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.

3.4 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do complete installation in accordance with the National Building Code of Canada 2015 Edition except where specified otherwise.

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

.4 All drawings, diagrams, sketches, raceway locations and routings, cable locations and routings, etc. illustrate intent only. Symbols on drawings indicate approximate locations. Refer to architectural plans and details. The contractor shall make all necessary adjustments to suit supplied equipment, and shall achieve the required functionality.

.5 Establish a detailed work plan with the general contactor. Submit the workplan to the Departmental Representative for approval.

.6 Coordinate electrical work requirements with all other trades on site to avoid conflict. Report any conflicts to the Departmental Representative. All electrical and control circuits provided for mechanical equipment shall be coordinated with the mechanical

contractor. Verify equipment nameplate ratings prior to installation and connection, and report any discrepancies to the Departmental Representative. Coordinate routing and final installation locations on site with mechanical trades. Provide all necessary equipment, raceways, fittings, fasteners and device boxes to provide a complete system. Coordinate all routing of data/communications raceways with communications contractor.

.7 Coordinate the sealing of all penetrations created by new installation with the general contractor. Fire-rated CSA approved compound required upon entering or exiting electrical rooms. Fire rating integrity in all other areas shall be maintained.

3.5 NAMEPLATES AND LABELS

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

3.6 LOCATION OF OUTLETS

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m, and information is given before installation.

.3 Locate light switches on latch side of doors.

3.7 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 Install electrical equipment at following heights unless indicated otherwise or superseded by other Codes or Standards.

- .1 Local switches: 1420 mm.
- .2 Light switches: 1420 mm.
- .3 Wall receptacles:
  - .1 General: 300 mm.
  - .2 Exterior: 450 mm.
  - .3 Above top of counters or counter splash backs: 178 mm.
- .4 Panelboards: as required by Code or as indicated.
- .5 Interior telephone outlets: 300 mm.
- .6 Exterior telephone outlets: 450 mm.

.3 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.8 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.9 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 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as time 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 - Quality Control.

- .1 Power distribution system including phasing, voltage, grounding and load balancing.
- .2 Circuits originating from branch distribution panels.
- .3 Lighting and its control.
- .4 Motors, heaters, and associated control equipment including sequenced operation of systems where applicable.
- .5 Insulation resistance testing:
  - .1 Test circuits, feeders and equipment rated up to 350 V with a 500 V instrument.
  - .2 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 - ACTION AND INFORMATIONAL 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.

3.10 SYSTEM STARTUP

.1 Instruct Departmental Representative 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.

3.11 CLEANING

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

.1 Leave Work area clean at end of each day.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA C22.2 No. 18.1-13 Metallic Outlet Boxes.
- .2 CSA C22.2 No. 45-(R2003), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.1-06(R2016), Rigid Types EB1 and DB2/EB2 PVC Conduit.
- .6 CSA C22.2 No. 211.2-06(R2016), Rigid PVC (Unplasticized) Conduit.

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 couplings.

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

.4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

.1 One-hole steel straps to secure surface conduits 35 mm and smaller.

- .1 Two-hole steel straps for conduits larger than 35 mm.

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

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

2.3 CONDUIT FITTINGS

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

.2 Use of factory "ells" is not permitted.

.3 Fittings for use in hazardous locations.

.4 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 service rooms and in unfinished areas.

.3 Use electrical metallic tubing (EMT).

.4 Use rigid pvc conduit underground and in wet areas, as indicated.

.5 Minimum conduit size for lighting and power circuits: 21 mm.

.6 Minimum conduit size for communications circuits: 27 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.

.1 Install conduit sealing fittings in hazardous areas.

.1 Fill with compound.

.2 Install fish cord in empty conduits.

.3 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.4 Dry conduits out before installing wire.

.5 Flexible Conduit:

.1 Liquid-tight flexible conduit, not smaller than 21 mm shall be used for final connections to all vibrating and/or mechanical equipment, including various systems' controls and related devices.

.2 Steel type connectors are to be used on flexible type conduits. Malleable type connectors are not permitted.

.6 EMT:

.1 Screw-on metal (malleable) type bushings are to be installed on all EMT connectors sized 1-¼ in. (35 mm) and larger. (To be installed prior to drawing-in conductors)

.2 EMT connectors sized 1 in. (27 mm) and smaller do not require insulated throats nor any types of screw-on type bushings.

.3 Rain-tight EMT connectors and couplings are to be used.

.4 EMT conduit stub is to be off-set out of wall into accessible ceiling space of room containing flush installed device box, and have steel EMT connector complete with plastic or grounding type bushings screwed on same. EMT plastic end cap bushings that are CSA approved may also be used.

.5 All EMT conduit wall stubs and associated boxes are to be adequately bonded to ground as per CEC requirements.

.7 All various types of systems, including lighting and power, whose wiring is to be installed on any exposed types of surfaces are always to be completely installed in raceway as per the following guidelines:

.1 Use EMT conduit in unfinished areas.

.2 Use aesthetic type surface raceway in finished areas where it is impossible to conceal conduits.

.3 Ceiling mounted conduit/raceway is to be secured directly to overhead structure.

.4 Wall mounted conduit/raceway is to be secured directly to, or directly on, exposed walls.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Run conduits in flanged portion of structural steel.

.3 Group conduits wherever possible on surface channels.

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

.5 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 UNDERGROUND

.1 Slope conduits to provide drainage.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

Part 2 Products

2.1 CABLE PROTECTION

.1 38 x 140 mm (trade size 2 in. x 6 in.) wood planks, pressure treated.

Part 3 Execution

3.1 DIRECT BURIAL OF CABLES

.1 Cables shall be buried to a depth (as measured from the top of the cable(s) to the surface of the land immediately surrounding the trench) that conforms with CSA 22.1-15 Table 53, and as indicated on drawings.

.2 Prepare the trench with a bed of sand with a minimum thickness (depth) of 75 mm.

.3 Lay cable(s) on the sand bed. Surround the cable(s) with 150 mm of sand above and on all sides of the cable(s).

.1 Do not pull cable into trench.

.4 Fill the trench with native material.

.1 Native materials shall not contain rocks greater than 50 mm in diameter for the first 300 mm above the sand bed.

.2 Compact the backfill every 300 mm of depth.

.5 Underground cable splices not acceptable.

.6 Cable separation:

.1 Maintain 75 mm minimum separation between cables of different circuits.

3.2 CABLE PROTECTION

.1 Install continuous row of pressure treated 38 x 140 mm wood planks to cover length of run.

.2 The wood planks shall be located 300 mm below the surface of the trench (as measured from the underside of the planks to the surface of the land immediately surrounding the trench).

.3 Install yellow caution marker tape on the wood planks to cover the entire length of the run.

3.3 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 Acceptance Tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000V megger on each phase conductor.

.6 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION