

PROJECT TITLE      MILLHAVEN ONTARIO  
CORRECTIONAL SERVICE CANADA  
MILLHAVEN INSTITUTION  
HIGHWAY. 33, PO BOX 280  
MILLHAVEN WALKWAY RECONSTRUCTION

PROJECT NUMBER    R.093606.001

PROJECT DATE        2018-05-11

**END OF SECTION**

**TABLE OF CONTENTS**

**Pages**

**Division 00 - Procurement and Contracting Requirements**

Section 00 00 00 - Title Sheet ..... 1  
Section 00 01 10 - Table of Contents ..... 2

**Division 01 - General Requirements**

Section 01 11 00 - Summary of Work ..... 2  
Section 01 14 00 - Work Restrictions ..... 2  
Section 01 31 19 - Project Meetings ..... 2  
Section 01 33 00 - Submittal Procedures ..... 4  
Section 01 35 13 - Special Project Procedures for Correctional Service Canada Security  
Requirements ..... 8  
Section 01 35 29 - Health & Safety Requirements ..... 4  
Section 01 35 43 - Environmental Procedures ..... 4  
Section 01 41 00 - Regulatory Requirements ..... 1  
Section 01 45 00 - Quality Control ..... 2  
Section 01 52 00 - Construction Facilities ..... 3  
Section 01 56 00 - Temporary Barriers and Enclosures ..... 2  
Section 01 74 20 - Construction / Demolition Waste Management and Disposal ..... 1

**Division 02 - Existing Conditions**

Section 02 41 13.14 - Asphalt Paving Removal ..... 2  
Section 02 41 23 - Selective Site Demolition ..... 3

**Division 03 - Concrete**

Section 03 10 00 - Concrete Forming and Accessories ..... 2  
Section 03 20 00 - Concrete Reinforcing ..... 2  
Section 03 30 00 - Cast-in Place Concrete ..... 4

**Division 07 - Thermal and Moisture Protection**

Section 07 13 20 - Self-Adhering Sheet Waterproofing ..... 12  
Section 07 21 13 - Board Insulation ..... 5

**Division 26 - Electrical**

Section 26 05 00 - Common Work Results for Electrical ..... 6  
Section 26 05 05 - Selective Demolition for Electrical ..... 3  
Section 26 05 20 - Wire and Box Connectors (0-1000 V) ..... 3  
Section 26 05 21 - Wires and Cables (0-1000 V) ..... 2

Section 26 05 28 - Grounding - Secondary.....	2
Section 26 05 29 - Hangers and Supports for Electrical Systems.....	2
Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings .....	2
Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings .....	2

**Division 31 - Earthwork**

Section 31 05 17 - Aggregate Materials.....	4
Section 31 22 13 - Rough Grading.....	2
Section 31 23 33.01 - Excavating Trenching and Backfilling .....	9
Section 31 32 21 - Geotextiles .....	1

**Division 32 - Exterior Improvements**

Section 32 11 16.01 - Granular Sub-Base.....	3
Section 32 11 20 - Granular Base .....	1
Section 32 12 16.01 - Asphalt Paving.....	2
Section 32 16 15 - Concrete Walks, Curbs and Gutters .....	3
Section 32 91 19.13 - Topsoil Placement and Grading .....	3
Section 32 92 23 - Sodding.....	3

**END OF TABLE**

**Part 1            General**

**1.1                WORK COVERED BY CONTRACT DOCUMENTS**

- .1        Work of this Contract comprises the upgrades of the Tunnel and Walkway. The upgrades include walkway restoration and waterproofing the tunnel. Additionally, electrical and structural repairs for the tunnel will be completed as indicated on the contract drawings. Work also included Contract is further identified as Project Number R.093606.001.

**1.2                CONTRACTOR USE OF PREMISE**

- .1        Co-ordinate use of premises under direction of Owner.
- .2        Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

**1.3                OWNER OCCUPANCY**

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

**1.4                DOCUMENTS REQUIRED**

- .1        Maintain at job site, one copy each document as follows:
  - .1        Contract Drawings.
  - .2        Specifications.
  - .3        Addenda and amendments.
  - .4        Reviewed Shop Drawings.
  - .5        List of Outstanding Shop Drawings.
  - .6        Change Orders.
  - .7        Other Modifications to Contract.
  - .8        Field Test Reports.
  - .9        Copy of Approved Work Schedule.
  - .10      Health and Safety Plan and Other Safety Related Documents.
  - .11      Other documents as specified.

**1.5                ALTERATIONS TO EXISTING SITE**

- .1        Remove and recycle, compost, anaerobically digest, sell material for reuse or dispose of items as indicated on contract drawings or as indicated 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                ACCESS AND EGRESS**

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

**1.2                USE OF SITE AND FACILITIES**

- .1    Work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2    Maintain existing services to building and provide for personnel and vehicle access.
- .3    Where security is reduced by work provide temporary means to maintain security.
- .4    Closures: protect work temporarily until permanent enclosures are completed.

**1.3                ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

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

**1.4                EXISTING SERVICES**

- .1    Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2    Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum.
- .3    Provide for personnel pedestrian and vehicular traffic.
- .4    Construct barriers in accordance with Section 01 56 00.

**1.5                SPECIAL REQUIREMENTS**

- .1    Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .2    Keep within limits of work and avenues of ingress and egress.
- .3    The Contractor shall not impeded CSC Patrol Vehicles for the duration of the Project.

**1.6                BUILDING SMOKING ENVIRONMENT**

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

**Part 2          Products**

**2.1              NOT USED**

.1          Not Used

**Part 3          Execution**

**3.1              NOT USED**

.1          Not Used

**END OF SECTION**

**Part 1 General**

**1.1 ADMINISTRATIVE**

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting 4 days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Unless directed otherwise by Departmental Representative, record minutes of meetings. Minutes shall be circulated to attending parties and affected parties not in attendance.
- .7 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

**1.2 PRECONSTRUCTION MEETING**

- .1 Within 15 days after award of Contract, request meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
  - .1 Appointment of official representative of participants in the Work.
  - .2 Schedule of Work.
  - .3 Schedule of submission of shop drawings, samples, mock-ups, colour chips. Submit submittals in accordance with Section 01 33 00.
  - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
  - .5 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
  - .6 Record drawings and specifications in accordance with Section 01 33 00.
  - .7 Monthly progress claims, administrative procedures, photographs, hold backs.
  - .8 Appointment of inspection and testing agencies or firms.

**1.3 PROGRESS MEETINGS**

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

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.
- .11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

**1.2 SHOP DRAWINGS AND PRODUCT DATA**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 10 working days for Departmental Representative's review of each submission.

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

- .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
- .2 Certificates must be dated after award of project contract complete with project name.
- .11 Submit three hard copies and one 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.
- .12 Submit three hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .13 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .14 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings by the departmental representative is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that the departmental representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

### **1.3 SAMPLES**

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to address identified by Departmental Representative.

- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

**1.4 PHOTOGRAPHIC DOCUMENTATION**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used

**END OF SECTION**

**Part 1           General**

**1.1            PURPOSE**

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

**1.2            DEFINITIONS**

- .1       "Contraband" means:
  - .1       An intoxicant, including alcoholic beverages, drugs and narcotics.
  - .2       Tobacco or associated tobacco products.
  - .3       An igniting device, lighter or matches.
  - .4       A weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization.
  - .5       An explosive or a bomb or a component thereof.
  - .6       Currency over any applicable prescribed limit, \$25 when possessed by an inmate without prior authorization.
  - .7       Any item not described in paragraphs 1.2.1.1 to 1.2.1.6 that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.
- .2       "Unauthorized Smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.
- .3       "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.
- .4       "CSC" means Correctional Service Canada.
- .5       "Director" means Director, Warden or Superintendent of the Institution as applicable.
- .6       "Construction Employees" means persons working for the General Contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.
- .7       "Departmental Representative" means the project manager from Public Works and Government Services Canada.
- .8       "Perimeter" means the fenced or walled area of the Institution that restrains the movement of the inmates.
- .9       "Construction Limits" means the area as shown on the contract drawings that the Contractor will be allowed to work. This area may or may not be isolated from the security area of the Institution.

### **1.3 PRELIMINARY PROCEEDINGS**

- .1 Prior to the commencement of work, the Contractor shall meet with the Director or his/her representative to:
  - .1 Discuss the nature and extent of all activities involved in the Project.
  - .2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.
- .2 Contractor shall:
  - .1 Ensure that all Construction Employees are aware of the security requirements.
  - .2 Ensure that a copy of the security requirements is always prominently on display at the job site.
  - .3 Co-operate with institutional personnel in ensuring that security requirements are observed by all Construction Employees.

### **1.4 CONSTRUCTION EMPLOYEES**

- .1 The Director may require that facial photographs may be taken of Construction Employees and these photographs may be displayed at appropriate locations in the Institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all Construction Employees. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the Construction Employees' clothing at all time while Construction Employees are in the institution.
- .2 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.
- .3 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
  - .1 Appear to be under the influence of alcohol, drugs or narcotics.
  - .2 Behave in an unusual or disorderly manner.
  - .3 Are in possession of contraband.
- .4 Smoking is prohibited anywhere on CSC property.

### **1.5 VEHICLES**

- .1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.
- .2 The Director may limit at any time the number and type of vehicles allowed within the Institution.
- .3 Drivers of delivery vehicles for material required by the project will not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The Director may require that these vehicles be escorted by Institutional Staff or Commissionaires while in the Institution.

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

## **1.6 PARKING**

- .1 . Parking area(s) to be used by Construction Employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.

## **1.7 SHIPMENTS**

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

## **1.8 TELEPHONES**

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

## **1.9 WORK HOURS**

- .1 Phase 1 & 2 work hours within the Institution are: Monday to Friday 08:00 a.m. to 3:30 p.m.
- .2 Phase 1 & 2 work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waived by the Director.
- .3 Phase 3 work will occur over a period of 1-2 weekends. The work will occur between Friday at 5:00 p.m. until Monday at 5:00 a.m. Work during the weekend will be for removals, waterproofing, sub-structure, installation & compaction, and form work building.
- .4 All concrete pouring work must occur during the work week after 4:00 p.m.

## **1.10 OVERTIME WORK**

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

## **1.11 TOOLS AND EQUIPMENT**

- .1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required.
- .2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.
- .3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.
- .4 Store all tools and equipment in approved secure locations.
- .5 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the Contractor. Scaffolding shall be secured and locked when not erected and when erected, will be secured in a manner agreed upon with the Institutional designate.
- .6 All missing or lost tools or equipment shall be reported immediately to the Director.
- .7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
  - .1 At the beginning and conclusion of every construction project.
  - .2 Weekly, when the construction project extends longer than a one week period.
  - .3 The Contractor may be subject to random checks by security staff to ensure proper storage and security of tools throughout the project.
- .8 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The Contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day.
- .9 If propane or natural gas is used for heating the construction, the Institution will require that an employee of the Contractor supervise the construction site during non-working hours.

- .10 If torches or grinders are required tools to perform Work, Contractor must complete a Hot Work Permit as supplied by CSC. Completed original form(s) are copied and posted on the work site in a conspicuous location. Original documents are to remain with the Institution.

## **1.12 KEYS**

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

## **1.13 SECURITY HARDWARE**

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

## **1.14 PRESCRIPTION DRUGS**

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

### **1.15 SMOKING RESTRICTIONS**

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

### **1.16 CONTRABAND**

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

### **1.17 SEARCHES**

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

### **1.18 ACCESS TO AND REMOVAL FROM INSTITUTION PROPERTY**

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

### **1.19 MOVEMENT OF VEHICLES**

- .1 Escorted commercial vehicles will be allowed to enter or leave the Institution through the sally port during the following hours:
  - .1 08:00 a.m. to 12:00 p.m.
  - .2 12:30 p.m. to 3:30 p.m.
- .2 Construction vehicles shall not leave the Institution until an inmate count is completed.
- .3 The Contractor shall advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

- .4 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC Staff or Commissionaires working under the authority of the Director.
- .5 Commercial Vehicles will only be allowed access to Institutional Property when their contents are certified by the Contractor or his/her representative as being strictly necessary to the execution of the construction project.
- .6 Vehicles shall be refused access to Institutional Property if, in the opinion of the Director, they contain any article which may jeopardize the security of the Institution.
- .7 Private vehicles of Construction Employees will not be allowed within the security wall or fence of medium or maximum security Institutions without the permission of the Director.
- .8 With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.
- .9 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

#### **1.20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY**

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

#### **1.21 SURVEILLANCE AND INSPECTION**

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

**1.22 STOPPAGE OF WORK**

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

**1.23 CONTACT WITH INMATES**

- .1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his/her security clearance revoked.
- .2 It is forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this Contract.

**1.24 COMPLETION OF CONSTRUCTION PROJECT**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Canadian Standards Association (CSA): Canada
  - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Building Code 2010 (NBC):
  - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .3 National Fire Code 2010 (NFC):
  - .1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
- .4 Province of Ontario:
  - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
  - .2 O. Reg. 490/09, Designated Substances.
  - .3 Workplace Safety and Insurance Act, 1997.
  - .4 Municipal statutes and authorities.
- .5 Treasury Board of Canada Secretariat (TBS):
  - .1 Treasury Board, Fire Protection Standard April 1, 2010 [www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text](http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text).

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
  - .3 Measures and controls to be implemented to address identified safety hazards and risks.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

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

### **1.3 FILING OF NOTICE**

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

### **1.4 SAFETY ASSESSMENT**

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

### **1.5 MEETINGS**

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

### **1.6 REGULATORY REQUIREMENTS**

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

### **1.7 GENERAL REQUIREMENTS**

- .1 . Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.
- .3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

### **1.8 COMPLIANCE REQUIREMENTS**

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

## **1.9 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.

## **1.10 UNFORSEEN HAZARDS**

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

## **1.11 POSTING OF DOCUMENTS**

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

## **1.12 CORRECTION OF NON-COMPLIANCE**

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

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

**1.13 BLASTING**

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

**1.14 POWDER ACTUATED DEVICES**

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

**1.15 WORK STOPPAGE**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used

**END OF SECTION**

**Part 1 General**

**1.1 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 humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

**1.2 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00.
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

**1.3 FIRES**

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

**1.4 DISPOSAL OF WASTES**

- .1 Do not bury rubbish and waste materials on site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

**1.5 EROSION AND SEDIMENT CONTROL (ESC)**

- .1 Prevent the loss of soil during construction by receiving streams during construction.
- .2 Prevent air pollution from dust and particulate matter during construction activities.
- .3 The Contractor is to designate an individual to be responsible for all aspects of ESC work.

**1.6 DRAINAGE AND DEWATERING SYSTEM**

- .1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, into waterways, sewer, drainage systems.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

**1.7 SITE CLEARING AND PLANT PROTECTION**

- .1 Protect trees and plants on site and adjacent properties not identified for removal.

- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.

## **1.8 WORK ADJACENT TO WATERWAYS**

- .1 Do not dump excavated fill, waste material or debris within 5 m of waterways.

## **1.9 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

## **1.10 NOTIFICATION**

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

## **Part 2 Products**

### **2.1 SILT FENCE FABRIC**

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

## **Part 3 Execution**

### **3.1 EXAMINATION AND MITIGATION**

- .1 Site verification of conditions and mitigation measures.

- .1 Follow guidelines presented in Table 5: Environmental Effects Analysis - Mitigation Measures and Residual Effects (Appendix A)
- .2 Confirm accessibility of site for equipment.

### **3.2 SITE-WIDE PRACTICES**

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

### **3.3 INSTALLATION OF ESC MEASURES**

- .1 Installation of the ESC measures is to be conducted in such a way that downstream measures (those measures closest to water course to be protected) are to be installed prior to upstream measures.
- .2 Temporary Stabilization Measures:
  - .1 Be aware that any contamination of stockpiled material or of graded surfaces by temporary stabilization method is to be resolved at the Contractor's expense.
- .3 Sedimentation Prevention Measures:
  - .1 Catch Basin Lid Filter Cloth .1 All catch basins and catch basin manholes are to have a double layer of geotextile placed under their lids to prevent sedimentation of the storm sewer system.
  - .2 Ditch Inlet Protection:
    - .1 All ditch inlets are to be protected by a straw bale flow check immediately upstream of the ditch inlet, until all areas draining into the ditch inlet have been permanently stabilized.
    - .2 All ditch inlets are to have a double layer of geotextile placed under their lids to prevent sedimentation of the storm sewer system.
  - .3 Construction activities are to minimize disturbance to grassed areas. Any grassed areas to be used for construction activities are to be cleared and stripped and topsoil is to be stockpiled. Areas are to be stabilized after construction activities are complete.

### **3.4 INSPECTION OF ESC MEASURES**

- .1 Once a week, or immediately after any rainfall event of at least 12 mm, each ESC measure onsite is to be inspected in its entirety. All ESC measures are to be maintained in good working order.
- .2 Inspection of Structural Measures:
  - .1 Silt fence:
    - .1 Silt fence is to be inspected for: depth of embedment, tears or holes, erosion around or under the fence, sagging or collapse.

- .2 Sediment accumulation reaching 1/3 fence height is to be removed and relocated to areas onsite of low erosion potential.
- .3 All seeded or planted areas are to be inspected to ensure vegetative growth. Where vegetation has washed away, or died off, additional seeding is to be applied. Ensure area has sufficient water to promote growth.

### **3.5 ESC MEASURE REMOVAL**

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

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES AND CODES**

- .1 Perform Work in accordance with National Building Code of Canada (NBC) 2010, National Fire Code of Canada (NFC) 2010 and Ontario Building Code (OBC) 2012, including all amendments up to closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.
- .2 Meet or exceed requirements of:
  - .1 Contract documents.
  - .2 Specified standards, codes and referenced documents.

**1.2 HAZARDOUS MATERIAL DISCOVERY**

- .1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's are discovered in course of work.

**1.3 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions and municipal bylaws.

**1.4 TAXES**

- .1 Pay applicable Federal, Provincial and Municipal taxes.

**1.5 EXAMINATION**

- .1 Examine existing conditions and determine conditions affecting work.

**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                INSPECTION**

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

**1.2                INDEPENDENT INSPECTION AGENCIES**

- .1     Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work, above and beyond those required of the Contractor. Cost of such services will be borne by Departmental Representative.
- .2     Provide equipment required for executing inspection and testing by appointed agencies.
- .3     Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4     If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

**1.3                ACCESS TO WORK**

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

**1.4                PROCEDURES**

- .1     Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2     Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

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

### **1.5 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

### **1.6 REPORTS**

- .1 Submit copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

### **1.7 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as may be requested.
- .2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used

## **Part 3 Execution**

### **3.1 NOT USED**

- .1 Not Used

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CSA 0121-08(R2013), Douglas Fir Plywood.
  - .3 CSA Z797-09(R2014), Code of practice for Access Scaffold.
  - .4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet.

**1.2 SUBMITTALS**

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

**1.3 INSTALLATION AND REMOVAL**

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

**1.4 SITE STORAGE/LOADING**

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

**1.5 CONSTRUCTION PARKING**

- .1 Parking will be permitted on site within a designated area for designated number of vehicles by Departmental Representative.
- .2 Provide and maintain adequate access to project site.
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

**1.6 OFFICES**

- .1 Provide office heated to 22°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

- .3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

## **1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in a 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 a manner to cause least interference with work activities.

## **1.8 SANITARY FACILITIES**

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

## **1.9 CONSTRUCTION SIGNAGE**

- .1 Locate project identification sign as directed by Departmental Representative and construct as follows:
  - .1 Build concrete foundation, erect framework, and attach signboard to framing.
  - .2 Paint all surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
  - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .2 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.
- .4 No other signs or advertisements, other than warning signs are permitted on site.

## **1.10 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .2 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .3 Protect travelling public from damage to person and property.
- .4 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

- .6 Construct access and haul roads necessary.
- .7 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .9 Dust control: adequate to ensure safe operation at all times.
- .10 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
- .11 Provide snow removal during period of Work.
- .12 Remove, upon completion of work, haul roads designated by Departmental Representative.

**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.
- .4 Stack stored new or salvaged material.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used

**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

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

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 52 00 - Construction Facilities.

**1.2 REFERENCES**

- .1 Canadian General Standards Board (CGSB):
  - .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
  - .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA):
  - .1 CSA O121-08(R2013), Douglas Fir Plywood.

**1.3 INSTALLATION AND REMOVAL**

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

**1.4 HOARDING**

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

**1.5 GUARD RAILS AND BARRICADES**

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

**1.6 ACCESS TO SITE**

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

**1.7 PUBLIC TRAFFIC FLOW**

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

**1.8 FIRE ROUTES**

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

**1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

**1.10 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used

**END OF SECTION**

**Part 1      General**

**1.1            CONSTRUCTION & DEMOLITION WASTE**

- .1      Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. On site sales are not permitted.
- .2      Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
  - .1      Provide facilities for collection, handling and storage of source separated wastes.
  - .2      Source separate the following waste:
    - .1      Brick and Portland cement concrete.
    - .2      Corrugated cardboard.
    - .3      Wood, not including painted or treated wood or laminated wood.
    - .4      Gypsum board, unpainted.
    - .5      Steel.
    - .6      Items indicated in Section 02.41.13.14, Asphalt Paving Removal
- .3      Submit proof that all waste is being disposed of at a licensed landfill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

**Part 2      Products**

**2.1            NOT USED**

- .1      Not Used

**Part 3      Execution**

**3.1            NOT USED**

- .1      Not Used

**END OF SECTION**

**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Methods for removal of existing asphalt pavement.

**1.2 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for recycling in accordance with Section 01 74 20.
- .2 Divert unused asphalt materials from landfill to local facility.

**Part 2 Products**

**2.1 EQUIPMENT**

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

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed.

**3.2 PROTECTION**

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

**3.3 REMOVAL**

- .1 Remove existing asphalt pavement to lines and grades as indicated.
- .2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.
- .3 Sawcut along lines designated on contract drawings to provide a clean true edge on existing asphalt.
- .4 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.
- .5 Provide for suppression of dust generated by removal process.

**3.4 FINISH TOLERANCES**

- .1 Finished surfaces in areas where asphalt pavement has been removed to be within +/-5 mm of grade specified but not uniformly high or low.

**3.5 SWEEPING**

- .1 Remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Section 02 41 13.14 Asphalt Paving Removal

**1.2 SUBMITTALS**

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

**1.3 QUALITY ASSURANCE**

- .1 Site Meetings.
  - .1 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work to determine extents of removal.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Perform Work in accordance with Section 01 35 43.
- .2 Waste Management and Disposal.
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

**1.5 SITE CONDITIONS**

- .1 Site Environmental Requirements.
  - .1 Perform work in accordance with Section 01 35 43.
  - .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
  - .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
    - .1 Ensure proper disposal procedures are maintained throughout the project.
  - .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
  - .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
  - .6 Protect trees, plants and foliage on site and adjacent properties where indicated.

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**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

**3.2 REMOVAL OPERATIONS**

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

**3.3 STOCKPILING**

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

**3.4 REMOVAL FROM SITE**

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

- .3 Transport material designated for alternate disposal using approved haulers listed in Waste Reduction Workplan and in accordance with applicable regulations.
  - .1 Written authorization from Departmental Representative is required to deviate from haulers listed in Waste Reduction Workplan.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
  - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
  - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

### **3.5 RESTORATION**

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

### **3.6 CLEANING**

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

**END OF SECTION**

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**Part 1      General**

**1.1      RELATED SECTIONS**

- .1      Section 03 30 00 - Cast-in-Place Concrete
- .2      Section 03 20 00 - Concrete Reinforcing

**1.2      REFERENCES**

- .1      Canadian Standards Association (CSA International)
  - .1      CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2      CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3      CSA O151-04, Canadian Softwood Plywood.
  - .4      CAN/CSA-S269.3-M92 (R2003), Concrete Formwork, National Standard of Canada

**1.3      SUBMITTALS**

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

**Part 2      Products**

**2.1      MATERIALS**

- .1      Formwork materials:
  - .1      For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.
- .2      Form ties:
  - .1      For concrete not designated 'Architectural', use removable or snapoff metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm diameter in concrete surface.
- .3      Form release agent: non-toxic, biodegradable, low VOC.
- .4      Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24mm<sup>2</sup>/s at 40°C, flashpoint minimum 150°C, open cup.

**Part 3 Execution**

**3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centres before proceeding with formwork and ensure dimensions agree with drawings.
- .2 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.
- .3 Align form joints and make watertight.
  - .1 Keep form joints to minimum.
- .4 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .5 Build in drains, conduit and grate frames required to accommodate Work specified in other sections.
- .6 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.
- .2 Re-use formwork 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 REFERENCES**

- .1 American Concrete Institute (ACI)
  - .1 SP-66-04, ACI Detailing Manual 2004.
    - .1 ACI 315-99, Details and Detailing of Concrete Reinforcement.
    - .2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
  - .2 CSA International
    - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
    - .2 CSA-A23.3-04, Design of Concrete Structures.
    - .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
  - .3 Reinforcing Steel Institute of Canada (RSIC)
    - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .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 Province of Ontario.
    - .1 Indicate placing of reinforcement and:
      - .1 Bar bending details.
      - .2 Lists.
      - .3 Quantities of reinforcement.
      - .4 Sizes, spacings, locations of reinforcement.

**1.4 QUALITY ASSURANCE**

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

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**Part 2 Products**

**2.1 MATERIALS**

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3 Cold-drawn annealed steel wire ties: to ASTM A 82/A 82M.
- .4 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .5 Welded steel wire fabric: to ASTM A 185/A 185M.
  - .1 Provide in flat sheets only.

**2.2 FABRICATION**

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

**Part 3 Execution**

**3.1 FIELD BENDING**

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

**3.2 PLACING REINFORCEMENT**

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

**3.3 CLEANING**

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

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

**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 REFERENCES**

- .1 ASTM International
  - .1 ASTM D 1751-04, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
- .3 CSA International
  - .1 CSA-A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CAN/CSA-G30.18-M92 (R2002), Billet-Steel Bars for Concrete Reinforcement.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.4 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 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 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
  - .1 Hot weather concrete.
  - .2 Cold weather concrete.
  - .3 Curing.
  - .4 Finishes.
  - .5 Formwork removal.
  - .6 Joints.

**1.5 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 the Departmental Representative.

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

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Cement: to CAN/CSA - A3000, Type GU.  
.2 Water: to CSA A23.1/A23.2.  
.3 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.  
.4 Premoulded joint filler:  
.1 Bituminous impregnated fibreboard: to ASTM D 1751.  
.5 Joint sealer/filler: grey to CAN/CGSB-19.24, Type 1, Class B.  
.6 Aggregates: to CAN/CSA-A23.1/A23.2. Coarse aggregates to be normal density.  
.7 Air entraining admixture: to ASTM C260.  
.8 Chemical admixtures: to CAN3-A266.2. The Departmental Representative is to accept accelerating or set retarding admixtures during cold and hot weather placing.  
.9 Concrete curing: in accordance with Section 32 16 15.

### **2.2 MIXES**

- .1 Use ready-mix concrete. Proportion concrete in accordance with CSA A23.1, Alternative 1 – Performance Method for Specifying Concrete.  
.2 Set performance characteristics of concrete in plastic state in coordination with all trades involved.  
.3 Meet performance criteria of concrete in hardened state as shown on structural drawings and provide verification of compliance.  
.4 Use water-reducing agent in all concrete.  
.5 Do not use admixtures containing chlorides.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Provide Departmental Representative 24 hours' notice before each concrete pour.

- .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 rehandling, and without damage to existing structure or Work.
- .4 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .6 Protect previous Work from staining.
- .7 Clean and remove stains prior to application of concrete finishes.
- .8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .9 Remove water and disturbed soil from excavations before placing concrete.
- .10 Before placing slab-on-grade, confirm that subgrade and backfill meet specifications and are free of frost and surface water.
- .11 Provide vapour barrier under slabs-on-grade as indicated.
  - .1 Lap minimum 150mm at joints and seal.
  - .2 Seal all punctures before placing concrete.
  - .3 Use patching material at least 150mm larger than puncture and seal.

### **3.2 INSTALLATION/ APPLICATION**

- .1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.
- .2 Sleeves and inserts:
  - .1 Cast in sump pit and other inserts required to be built-in.
- .3 Hot Weather Concreting:
  - .1 Contractor to comply with CAN/CSA-A23.1/A23.2. If temperature is expected to, or exceeds, -25 degrees celcius take the necessary precautions. The Departmental Representative must accept hot weather concreting and protection.
- .4 Cold Weather Concreting:
  - .1 Contractor to comply with CAN/CSA-A23.1/A23.2. Ensure that all surfaces unless noted otherwise that come in contact with fresh concrete are at a minimum of -5 degrees celcius and are kept at -10 degrees celcius for 5 days or -15 degrees celcius for 3 days. Finished slabs must be placed on surfaces that are at least -13 degrees celcius. Obtain Departmental Representative's review and approval of cold-weather concreting and protection procedures before proceeding with any cold-weather concreting.

**3.3 FINISHES**

- .1 Finish concrete to CSA A23.1/A23.2.
- .2 Concrete Sidewalk: As per Section 32 16 15.

**3.4 CURING**

- .1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.

**3.5 SITE TOLERANCES**

- .1 Concrete slab finishing tolerance to CSA A23.1/A23.2.

**3.6 FIELD QUALITY CONTROL**

- .1 Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative.
- .2 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

**3.7 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Use trigger operated spray nozzles for water hoses.
- .3 Designate cleaning area for tools to limit water use and runoff.
- .4 Dispose of excess concrete off-site.
- .5 Wash trucks off-site.
- .6 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED WORK**

- .1        Section 33 Site Works
- .2        Section 03 05 10: Cast-in-Place Concrete
- .3        Section 07 21 13: Rigid Insulation

**1.2                SUBMITTALS**

- .1        Prior to commencing the Work, submit copies of manufacturers current certification to ISO 9000. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.
- .2        Prior to commencing the Work submit manufacturers complete set of standard details for waterproofing systems.

**1.3                QUALITY ASSURANCE**

- .1        Perform Work in accordance with the printed requirements of the membrane manufacturer and this specification. Advise Departmental Representative of any discrepancies prior to commencement of the Work.
- .2        Maintain one copy of manufacturers literature on site throughout the execution of the Work.
- .3        At the beginning of the Work and at all times during the execution of the Work, allow access to site by the waterproofing membrane manufacturer's representative.
- .4        Materials used in this Section, including, primers, mastics and membranes, asphaltic protection boards, composite drainage boards and expansion joint membranes shall be fully compatible and shall be sourced and or produced by one manufacturer.
- .5        Submit copies of the membrane manufacturers current ISO certification including the manufacturing of the membrane, primer, mastics, adhesives and asphaltic protection board.

**1.4                DELIVERY, STORAGE AND HANDLING**

- .1        Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
- .2        Cold applied elastomeric membrane should be stored in closed containers outdoors.
- .3        Store membrane at temperature of 5 degrees C (40 degrees F) and above to facilitate handling.
- .4        Membrane contain petroleum solvents and are flammable. Do not use near open flame.
- .5        Store role materials horizontally in original packaging.

- .6 Store adhesives and primers at temperatures of 5 degrees C and above to facilitate handling.
- .7 Keep solvents away from open flame or excessive heat.

## **1.5 CO-ORDINATION**

- .1 Ensure continuity of the waterproofing membrane throughout the scope of this section.
- .2 Work shall be so scheduled as to provide a watertight seal at the end of each working day on the areas worked upon during the day.

## **1.6 SITE CONDITIONS**

- .1 Environmental Requirements
  - .1 No installation work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.
- .2 Protection
  - .1 Provide adequate protection of materials and work of this section from damage by weather backfilling operations and other causes.
  - .2 Protect work of other trades from damage resulting from work of this section. Make good such damage at own expense to satisfaction of the Departmental Representative.
  - .3 Apply protection board as soon as possible after installation of membrane.

## **1.8 WARRANTY**

- .1 For the Work of this Section, provide 5 year warranty period. Scope of warranty shall include materials required to return the membrane to a watertight condition.

## **1.9 MOCK-UP**

- .1 Install Self-Adhering Sheet Waterproofing membrane to one area as a mock-up of erected example of work complete with specified materials and workmanship.
- .2 Before continuation of work, have Self-Adhering Sheet Waterproofing membrane manufacturer representative inspect the test area prior to work commencing.
- .3 Before commencing work, Manufacturer representative to examine and inspect the mock-up test area and report in writing to Departmental Representative any conditions which would adversely affect the installations and / or warranties. In addition letter to denote that the mock-up test area is acceptable prior to any further installations.

Any extra work required is not to be paid by Departmental Representative. Commencement of the work shall imply acceptance of the installation. Upon written approval from Manufacturer, work can proceed. Commencement of the work shall imply acceptance of the installation.

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**Part 2 Products**

**2.1 COMPONENTS AND MATERIALS**

- .1 Components and materials must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

**2.2 WATERPROOFING MEMBRANE**

- .1 Waterproofing Membrane Manufacturer: to be approved by Departmental Representative.

**2.3 MEMBRANES**

- .1 Primary Waterproofing Membrane shall be SBS modified bitumen, self-adhering sheet membrane with a cross-laminated polyethylene film, and having the following physical properties:
- .1 Thickness: 1.5 mm (60 mils) min,
  - .2 Flexibility: Pass @ -40 degrees C to ASTM D1970, .3 Vapour permeance: 2.8 ng/Pa.s.m<sup>†</sup> (0.05 perms) to ASTM E96,
  - .4 Tensile strength (membrane): 2.24 MPa to ASTM D412,
  - .5 Tensile strength (film): 34.5 MPa to ASTM D882,
  - .6 Elongation: 300% to ASTM D412,
  - .7 Puncture resistance: 222 N min. to ASTM E154.

**2.4 PRIMERS**

- .1 Primer for self-adhering waterproofing membrane: polymer emulsion based adhesive type, quick setting for temperatures above -4 degrees C, having the following physical properties:
- .1 Colour: Aqua,
  - .2 Weight: 1.0 kg/l,
  - .3 Solids by weight: 53%,
  - .4 Water based, no solvent odours,
  - .5 Drying time (initial set): 30 minutes,
- .2 Primer for self-adhering waterproofing membrane: synthetic rubber based adhesive type, quick setting for all temperatures, having the following physical properties:
- .1 Colour: Blue, Yellow,
  - .2 Weight: 0.8 kg/l,
  - .3 Solids by weight: 35%,
  - .4 Drying time (initial set): 30 minutes.

**2.5 SEALING COMPOUND**

- .1 Liquid Membrane & Termination Sealant shall be compatible with sheet waterproofing membrane, substrate and insulation materials, complies with CGSB 37.29, remains flexible with ageing and chemically resistant to alkalis, calcium chloride, mild acid and salt solutions.

**2.6 DRAINAGE BOARD**

- .1 Prefabricated Drainage Board (Vertical & Horizontal) shall be prefabricated composite drain board, a polypropylene core board with polypropylene fabric attached, having the following physical properties:
  - .1 Flow Rate (V): 223 L/min/m,
  - .2 Flow Rate (H): 40 L/min/m,
  - .3 Compressive Strength: 15,100 psf,
  - .4 Thickness: 10 mm

## **2.7 PREFABRICATED DRAINAGE BOARD ACCESSORIES**

- .1 Securement Bars: Continuous 6mm x 20mm (1/4" x 3/4") HDPE bar for screw attachment.
- .2 Moulding Strip: Continuous 90mm wide "Z" flashing strip to fit over exposed top edge of drain board.
- .3 Drain Board Plugs & Nails: HDPE pre-moulded washer to fit dimples c/w high strength, corrosion resistant concrete nails.

## **2.8 BARS**

- .1 Securement bars shall be continuous aluminum, stainless steel or galvanized metal, 3 mm x 25 mm in size and shall be pre-drilled for non-corrosive screw attachment on a maximum of 300 mm (12") centers.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verify that surfaces and conditions are ready to accept the Work of this section. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.

### **3.2 PREPARATION**

- .1 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar, frost or other contaminants. Fill spalled areas in substrate to provide an even plane.
- .2 New concrete should be cured for a minimum of 7 days and must be dry before waterproofing membranes are applied. Lightweight structural concrete must be cured a minimum of 14 days.
- .3 Use appropriate waterproofing membrane primer as by manufacturer based on air and surface temperature at time of application.

### **3.3 PRIMER**

- .1 Apply primer for self-adhered membrane by roller or spray at rate recommended by manufacturer.

- .2 Allow minimum 30 minute open time. Primed surfaces not covered by waterproofing membrane during the same working day must be re-primed.

### **3.4 JOINT AND CRACK TREATMENT**

- .1 All cracks in concrete 1.5mm to 3mm wide are to be pre-treated with a 1.5 mm (60 mil) coating of liquid membrane 50 mm wide centred on the crack. Alternately, apply a 150-mm wide strip of waterproofing membrane centred over crack. Provide 75 mm end laps.
- .2 Horizontal to vertical inside corner transition areas are to be pre-treated with a liquid membrane fillet extending 19 mm vertically and horizontally from the corner. Apply a minimum 225 mm strip of waterproofing membrane centred at the joint.
- .3 All outside corners are to be pre-treated with a minimum 225 mm strip of waterproofing membrane centred at the joint.
- .4 Where three or more planes come into contact reinforce with cut sections of waterproofing membrane reinforcing sheet as per manufacturers instructions.

### **3.5 PROJECTIONS**

- .1 Extend waterproofing membrane tight to projection and seal with liquid membrane extending 65 mm along projection and 65 mm onto waterproofing membrane.
- .2 Provide extra waterproofing self-adhering composite membrane over drainage board and rigid insulation. Extend min. 50mm up foundation wall and 50 mm down drainage board. Use termination seal top of this membrane to foundation wall.

### **3.6 WATERPROOFING VERTICAL APPLICATIONS**

- .1 Apply waterproofing membrane to prepared Membrane - substrate in lengths of 2400 mm or less.
- .2 Provide 65 mm laps at both sides and ends. Position for alignment and remove protective film. Press firmly into place. Promptly roll all laps with a counter top roller to effect seal. If more than one length is required on a vertical surface, apply in a shingle fashion.
- .3 Terminate membrane using termination mastic or termination bar, reglet or counter flashing as indicated. Refer to manufacturers standard details.
- .4 All laps within 300 mm of a 90 degrees change in plane are to be sealed with termination sealant.

### **3.7 WATERPROOFING MEMBRANE - APPLICATIONS**

- .1 Apply 2 plies of waterproofing membrane to prepared substrate in lengths of Horizontal 2400mm or less.
- .2 Provide 65 mm laps at both sides and ends. Position for alignment and remove protective film. Press firmly into place. Promptly roll all laps with a counter top roller to effect seal. If more than one length is required on a vertical surface, apply in a shingle fashion.

- .3 Terminate membrane using termination mastic or termination bar, reglet or counter flashing as indicated. Refer to manufacturers standard details.
- .4 All laps within 300 mm of a 90 degrees change in plane are to be sealed with termination sealant.

### **3.8 INSTALLATION OF PROTECTION BOARD**

- .1 Protection Boards shall be installed over the waterproofing membrane to prevent damage from materials used in backfilling.
- .2 Apply protection board adhesive in 12 mm wide strips spaced at 450 mm o/c to cure waterproofing membrane. Immediately embed protection board and press into adhesive to ensure full contact.
- .3 Do not backfill until adhesive has cure dried. Do not use excessive levels of adhesive.

### **3.9 INSTALLATION (VERTICAL)**

- .1 Align and hang drainage up to of Drainage Board foundation wall. Position bottom edge of drainage board to be in moderate contact with weeping tile system.
- .2 Secure drainage board to foundation wall with nails and washers spaced 450 mm o/c horizontally. Install minimum of 2 rows staggered and spaced 150 mm apart and min 150 from top edge.
- .3 Align and install termination strip along top edge with nails spaced 300 mm o/c and seal with termination sealant.
- .4 Align and install moulding strip over completed top edge detail.
- .5 Overlap end laps, pull back loose fabric to expose drain core and position core of second panel over the overlap flange of first panel.
- .6 Bend drain board to create inside corners and cut board to create outside corners, provide 75 mm of extra fabric to wrap corner.
- .7 Stagger or offset joints of drain board sheets.
- .8 Place all subsequent sheets in an overlapping single fashion.
- .9 Backfill bottom edge in conjunction with weeping tile system.

### **3.110 INSTALLATION OF DRAINAGE BOARD (HORIZONTAL)**

- .1 The edge of the core flange shall be at the higher edges of the substrate, away from drains.
- .2 Overlap in the direction of water flow. Pull back loose fabric to expose drain core and position core of second panel over the overlap flange of first panel.

- .3 Bend drain board to create inside corners and cut board to create outside corners, provide 3 inch of extra fabric to wrap corner.
- .4 Stagger or offset joints of drain board sheets.
- .5 Place all subsequent sheets in an overlapping single fashion.

**3.11 CLEAN-UP**

- .1 Promptly as the work proceeds and on completion clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing work.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Polystyrene insulation.
- .2 Related Sections:
  - .1 Section 07 21 13 – Self-Adhering Sheet Waterproofing

**1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM C1289-14a, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .2 Canadian Gas Association (CGA)
  - .1 CAN/CGA-B149.1-05, Natural Gas and Propane Installation Code Handbook.
  - .2 CAN/CGA-B149.2-10, Propane Storage and Handling Code.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 71-GP-24M-77 R83, Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S604-M91, Standard for Type A Chimneys.
  - .2 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
  - .3 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Board, Faced – Third Edition.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordinate with other building subtrades.
  - .4 Review manufacturer’s installation instructions and warranty requirements.

**1.4 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Action Submittals:
  - .1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and data sheet for each product listed in Part 2.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

- .1 Protect building materials from damage by:
  - .1 Fully covering stored materials
  - .2 Elevating stored materials off ground
  - .3 Disposing of materials with evidence of moisture damage

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities in accordance with Section 01 74 20 – Construction/Demolition Waste Management And Disposal.

## **Part 2 Products**

### **2.1 INSULATION**

- .1 Extruded Polystyrene (Type B): Type 4 to CAN/ULC S701, thickness indicated, minimum compressive strength 210 kPa, RSI 0.87 per 25 mm thickness, shiplapped edges.
  - .1 Location: As denoted on the drawings.
  - .2 Products to be approved by Departmental Representative.

### **2.2 ADHESIVE**

- .1 Adhesive for Bonding Insulation: to CGSB 71-GP-24.
  - .1 Type 1: flexible synthetic rubber base, solvent type, suitable for bead application by caulking gun, fungi resistant, application temperature -12C to 50C
  - .2 Compatible with insulation, and substrate.

### **2.3 ACCESSORIES**

- .1 Fasteners: As per Manufacturer's recommendations.
- .2 Insulation Washers: As per Manufacturer's recommendations.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

### **3.2 EXAMINATION**

- .1 Examine substrates and immediately inform Departmental Representative in writing of defects.
- .2 Prior to commencement of work ensure:
  - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

### **3.3 INSTALLATION – GENERAL**

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Keep combustible insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4 S604 type A chimneys and CAN/CGA B149.1 and CAN/CGA B149.2 type B and L vents.
- .5 Cut and trim insulation neatly to fit spaces.
- .6 Use only insulation boards free from chipped or broken edges.
- .7 Use largest possible dimensions to reduce number of joints.
- .8 Fasten insulation in place using type of fastener applicable to substrate.
  - .1 Follow manufacturers written installation instructions for minimum fasteners per insulation board.
- .9 Leave insulation board joints unbonded over line of expansion and control joints.
  - .1 Bond continuous 150 mm wide 0.15 mm polyethylene strip over expansion and control joints using compatible adhesive before application of insulation.
- .10 Butt insulation tightly together at side joints and end laps and fill voids entirely with general purpose spray-foam sealant to provide complete thermal barrier.
  - .1 Offset vertical joints.
  - .2 Offset both vertical and horizontal joints in multiple layer applications.

### **3.6 CLEANING**

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

**END OF SECTION**

**Part 1**

**General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 23 28 33.02
- .2 Section 23 83 00
- .3 Section 23 83 00.01

**1.2 REFERENCE STANDARDS**

- .1 CSA Group
  - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (26th Edition), Safety Standard for Electrical Installations.
  - .2 CAN3-C235-83 (R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
  - .1 IEEE SP1122-2000, 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 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for electrical equipment and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop drawings:
  - .1 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.
  - .2 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
  - .3 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
  - .4 Submit two (2) copies of 600 x 600 mm minimum size drawings and product data to inspection authorities.

- .5 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Certificates:
  - .1 Provide CSA certified equipment and material.
  - .2 Where CSA certified equipment and material is not available, submit such material and equipment 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 Authority having jurisdiction of contract.
  - .5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
  - .6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

## **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 electrical equipment 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 Operating 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.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect equipment from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

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**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 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 material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval 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 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 as shown on mechanical drawings or specified in mechanical sections.

**2.4 WARNING SIGNS**

- .1 Warning Signs: in accordance with requirements of Departmental Representative and inspection authorities.
- .2 Decal signs, minimum size 175 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 Identify electrical equipment with nameplates as follows:
  - .1 Nameplates: lamicoïd 3 mm thick plastic engraving sheet black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.

.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

- .2 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .3 Allow for minimum of twenty-five (25) letters per nameplate.
- .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .5 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .6 Terminal cabinets and pull boxes: indicate system and voltage.

**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 CONDUIT AND CABLE IDENTIFICATION**

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Pre-paint paint boxes, couplings and connectors.
- .3 Colours:

Type	Prime	Auxiliary
up to 250 V	Yellow	

**2.9 FINISHES**

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

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**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 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 INSTALLATION**

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

**3.3 NAMEPLATES AND LABELS**

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

**3.4 MOUNTING HEIGHTS**

- .1 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .2 Install electrical equipment at following heights unless indicated otherwise.
  - .1 Panelboards: as required by Code or as indicated.

**3.5 CO-ORDINATION OF PROTECTIVE DEVICES**

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

**3.6 FIELD QUALITY CONTROL**

- .1 Load Balance:
  - .1 Measure phase current to panelboards with normal loads (heating) 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, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
  - .1 Power distribution system including phasing, voltage, grounding and load balancing.
  - .2 Circuits originating from branch distribution panels.
  - .3 Insulation resistance testing:
    - .1 Megger circuits, feeders and equipment 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.

### **3.7 SYSTEM STARTUP**

- .1 Instruct operating personnel and 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.

### **3.8 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**

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**Part 1 General**

**1.1 SUMMARY**

- .1 This Section includes requirements for selective demolition and removal of electrical components including removal of conduit, junction boxes, and panels to source and incidentals required to complete work described in this Section.

**1.2 RELATED REQUIREMENTS**

- .1 Section 02 41 13– Selective Site Demolition
- .2 Section 02 41 16– Structure Demolition
- .3 Section 02 41 19.16– Selective Interior Demolition
- .4 Section 02 41 99– Demolition for Minor Works

**1.3 REFERENCE STANDARDS**

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

**1.4 DEFINITIONS**

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

**1.5 QUALITY ASSURANCE**

- .1 Regulatory Requirements: Perform work of this Section in accordance with:
  - .1 Provincial/Territorial Workers' Compensation Boards/Commissions and Federal Workers' Compensation Service
  - .2 Government of Canada, Labour Program: Workplace Safety and Provincial/Territorial Occupational Health and Safety Standards and Programs

**1.6 SITE CONDITIONS**

- .1 Condition of materials identified as being salvaged or demolished are based on their observed condition at time of site examination.

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**Part 2 Products**

**2.1 NOT USED REPAIR MATERIALS**

- .1 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.
- .2 Firestopping Repair Materials: Use firestopping materials compatible with existing firestopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

**2.2 SALVAGE AND DEBRIS MATERIALS**

- .1 Material Ownership: Demolished materials become Contractor 's property and will be removed from Project site; except for items indicated as being reused, salvaged, reinstalled, or otherwise indicated to remain.
- .2 Salvaged Materials: Carefully remove materials designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with Section 02 42 00.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect work of this Section. Notify in writing the departmental representative any discrepancies between existing conditions and contract documents.

**3.2 PREPARATION**

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
  - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
  - .2 Notify Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
  - .3 Prevent debris from blocking drainage inlets.
  - .4 Protect mechanical systems that will remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with use of the building by Owner and users is minimized and as follows:
  - .1 Prevent debris from endangering safe access to and egress from occupied buildings.
  - .2 Notify Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

### **3.3 EXECUTION**

- .1 Removal Demolition: Coordinate requirements of this Section with information contained in Section 02 41 19.19 Section 02 41 19.13 and as follows:
  - .1 Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
  - .2 Perform demolition work in a neat and workmanlike manner:
    - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
    - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
  - .3 Place weatherproof blank cover plates on outlet boxes remaining after demolition and removal activities.
  - .4 Remove existing conduits, boxes, cabling and wiring associated with removed electrical devices and equipment.
  - .5 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
  - .6 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

### **3.4 CLOSEOUT ACTIVITIES**

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCE STANDARDS**

- .1    CSA International
  - .1        CAN/CSA-C22.2 No.18-98 (R2003), Outlet Boxes, Conduit Boxes and Fittings.
  - .2        CAN/CSA-C22.2 No.65-03 (R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).
- .2    Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
  - .1        EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3    National Electrical Manufacturers Association (NEMA)

**1.2                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 wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

**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 wire and box connectors for incorporation into manual.

**1.4                DELIVERY, STORAGE AND HANDLING**

- .1    Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2    Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3    Storage and Handling Requirements:
  - .1        Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2        Store and protect wire and box connectors from nicks, scratches, and blemishes.
  - .3        Replace defective or damaged materials with new.

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**Part 2 Products**

**2.1 MATERIALS**

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:
  - .1 Connector body and stud clamp for conductors copper.
  - .2 Clamp for copper conductors.
  - .3 Bolts for copper conductors.
  - .4 Sized for conductors as required.
- .4 Clamps or connectors for TECK cable, as required to: CAN/CSA-C22.2 No.18.

**Part 3 Execution**

**3.1 EXAMINATION**

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

**3.2 INSTALLATION**

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

**3.3 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**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 26 05 20.

**1.2                REFERENCE STANDARDS**

- .1            CSA C22.1-2015, 26<sup>th</sup> Edition.

**1.3                PRODUCT DATA**

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

**Part 2            Products**

**2.1                BUILDING WIRES**

- .1            Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2            Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE or RW90 XLPE, Non Jacketted.

**2.2                TECK 90 CABLE**

- .1            Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2            Conductors:
  - .1            Grounding conductor: copper.
  - .2            Circuit conductors: copper, size as indicated.
- .3            Insulation:
  - .1            Cross-linked polyethylene XLPE.
  - .2            Rating:, 600 V.
- .4            Inner jacket: polyvinyl chloride material.
- .5            Armour: aluminum interlocking.
- .6            Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
- .7            Fastenings:
  - .1            One hole aluminum straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
  - .2            Channel type supports for two or more cables at 900 mm centers.
  - .3            Threaded rods: 6 mm diameter to support suspended channels.
- .8            Connectors:
  - .1            Watertight, approved for TECK cable.

**Part 3 Execution**

**3.1 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform insulation tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

**3.2 GENERAL CABLE INSTALLATION**

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

**3.3 INSTALLATION OF BUILDING WIRES**

- .1 Install wiring as follows:
  - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

**3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)**

- .1 Group cables wherever possible on channels.
- .2 Install cable exposed, securely supported by straps.

**END OF SECTION**

**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 grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

**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 grounding equipment for incorporation into manual.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 EQUIPMENT**

- .1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.
- .2 Insulated grounding conductors: green, copper conductors, size as indicated.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
  - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Departmental Representative.

### **3.2 INSTALLATION GENERAL**

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

### **3.3 EQUIPMENT GROUNDING**

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, control panels, distribution panels, electric heaters, etc.

### **3.4 FIELD QUALITY CONTROL**

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

### **3.5 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**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 26 05 21.

**1.2                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 hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

**1.3                DELIVERY, STORAGE AND HANDLING**

- .1            Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2            Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3            Storage and Handling Requirements:
  - .1            Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2            Store and protect hangers and supports from nicks, scratches, and blemishes.
  - .3            Replace defective or damaged materials with new.

**Part 2            Products**

**2.1                SUPPORT CHANNELS**

- .1            U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted.

**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 hangers and supports installation in accordance with manufacturer's written instructions.
  - .1            Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .2            Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2           INSTALLATION**

- .1     Secure surface mounted equipment with screws or bolts with washer standoffs (6 mm gap).
- .2     Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .3     Fasten exposed conduit or cables to building construction or support system using straps.
  - .1       One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
  - .2       Two-hole steel straps for conduits and cables larger than 50 mm.
- .4     For surface mounting of two or more conduits use channels at 900 mm on centre spacing.
- .5     Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .6     Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .7     Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .8     Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

### **3.3           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 20.
- .2        Section 26 05 34.

**1.2                REFERENCE STANDARDS**

- .1        Canadian Standards Association (CSA International)
  - .1        CSA C22.1-15, Canadian Electrical Code, Part 1, 26th Edition.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Submit samples for floor box in accordance with Section 01 33 00 - Submittal Procedures.

**1.4                DELIVERY, STORAGE AND HANDLING**

- .1        Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

**Part 2            Products**

**2.1                OUTLET AND CONDUIT BOXES GENERAL**

- .1        Size boxes in accordance with CSA C22.1.
- .2        102 mm square or larger outlet boxes as required.
- .3        Blank cover plates for boxes without wiring devices.

**2.2                GALVANIZED STEEL OUTLET BOXES**

- .1        Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

**2.3                CONDUIT BOXES**

- .1        Cast aluminum FD boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

**2.4                FITTINGS - GENERAL**

- .1        Bushing and connectors with nylon insulated throats.
- .2        Knock-out fillers to prevent entry of debris.
- .3        Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

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

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .4 Identify systems for outlet boxes as required.

**END OF SECTION**

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**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
  - .2 CSA C22.2 No. 211.2-M1984 (R2003), Rigid PVC (Unplasticized) Conduit.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

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

**Part 2 Products**

**2.1 CABLES AND REELS**

- .1 Provide cables on reels or coils.
  - .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
- .2 Each coil or reel of cable to contain only one continuous cable without splices.

**2.2 CONDUITS**

- .1 Rigid PVC conduit: to CSA C22.2 No. 211.2.

**2.3 CONDUIT FITTINGS**

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.  
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for NPS 1 25 mm and larger conduits.

**2.4 FISH CORD**

- .1 Polypropylene.

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**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 Surface mount conduits.
- .3 Use rigid PVC conduit in tunnels.
- .4 Minimum conduit size for lighting and power circuits: 19 mm NPS 3/4.
- .5 Bend conduit cold:
  - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .6 Remove and replace blocked conduit sections.
  - .1 Do not use liquids to clean out conduits.
- .7 Dry conduits out before installing wire.

**3.3 SURFACE CONDUITS**

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Group conduits wherever possible on surface channels.

**3.4 CONDUITS UNDERGROUND**

- .1 Duct seal conduits to prevent water and condensation from entering tunnel.
- .2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

**3.5 CLEANING**

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

**END OF SECTION**

**Part 1           General**

**1.1               REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .2 Ontario Provincial Standard Specification (OPSS)
  - .1 OPSS 1004 - Material Specification for Aggregates - Miscellaneous - Nov. 2005.
  - .2 OPSS 1010 - Materials Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Materials - April 2004.

**1.2               SAMPLES**

- .1 Submit samples in accordance with Section 01 33 00.
- .2 Allow continual sampling by Departmental Representative during production.
- .3 Provide Departmental Representative with access to source and processed material for sampling.
- .4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
- .5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
- .6 Provide water, electric power and propane to Departmental Representative laboratory trailer at production site.

**1.3               WASTE MANAGEMENT AND DISPOSAL**

- .1 Divert unused granular materials from landfill to local quarry facility as approved by Departmental Representative.

**Part 2           Products**

**2.1               MATERIALS**

- .1 Granular 'A' to OPSS 1010.
- .2 Granular 'B' Type II to OPSS 1010.
- .3 Select Subgrade Material to OPSS 1010.
- .4 Clear Stone to OPSS 1004.
- .5 Crushed Stone to OPSS 1004.

- .6 Limestone screening shall be composed of clean, hard durable particles of natural screenings resulting from the crushing of rock, stone or gravel and shall be free of clay silt or objectionable material meeting all OPSS 1001, 1004 and 1010. Material shall meet the following gradation requirements as noted below:

Percentage passing by dry weight.

<u>Sieve Size</u>	<u>% Passing</u>	<u>Allowable Limits %</u>
9.50 mm	100.0	100
4.75 mm	99.8	50-100
2.36 mm	79.1	
1.18 mm	48.3	20-55
600.0 µm		
300.0 µm	22.5	10-30
150.0 µm		
75 µm	7.0	0-12

µm = 1 micron = 1/1000 mm

## 2.2 SOURCE QUALITY CONTROL

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 weeks prior to commencing production.
- .2 If, in opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
- .3 Advise Departmental Representative 4 weeks in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

## Part 3 Execution

### 3.1 PREPARATION

- .1 Topsoil stripping
- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
- .2 Begin topsoil stripping of areas as indicated after area has been cleared of trees, brush, weeds, and grasses and removed from site.
- .3 Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.
- .4 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.

- .5 Dispose of topsoil to location as indicated as directed by Departmental Representative off site.
- .2 Aggregate source preparation
  - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Departmental Representative.
  - .2 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
  - .3 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
  - .4 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .3 Processing
  - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
  - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.
  - .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
  - .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- .4 Handling
  - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .5 Stockpiling
  - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.
  - .2 Stockpile aggregates in sufficient quantities to meet Project schedules.
  - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
  - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
  - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
  - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 h of rejection.
  - .7 Stockpile materials in uniform layers of thickness as follows:
    - .1 Max 1.5 m for coarse aggregate and base course materials.
    - .2 Max 1.5 m for fine aggregate and sub-base materials.

- .3 Max 1.5 m for other materials.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

**3.2 CLEANING**

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        None.

**1.2                REFERENCES**

- .1        American Society for Testing and Materials (ASTM)
  - .1        ASTM D698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m<sup>3</sup>).

**1.3                EXISTING CONDITIONS**

- .1        Examine existing conditions as per the contract documents.

**1.4                PROTECTION**

- .1        Protect and/or transplant existing fencing trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.
- .2        Maintain access roads to prevent accumulation of construction related debris on roads.

**Part 2            2            PRODUCTS**

**2.1                MATERIALS**

- .1        Fill material: In accordance with Section 31 23 33.01.
- .2        Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Departmental Representative.

**Part 3            3            EXECUTION**

**3.1                STRIPPING OF TOPSOIL**

- .1        Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Departmental Representative.
- .2        Commence topsoil stripping of areas as indicated after area has been cleared of brush weeds and grasses and removed from site.
- .3        Strip topsoil to depths as indicated. Rototill weeds and grasses and retain as topsoil on site. Avoid mixing topsoil with subsoil.
- .4        Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.
- .5        Dispose of unused topsoil off site.

**3.2 GRADING**

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades:
  - .1 As per contract drawings.
- .3 Slope rough grade away from building as indicated.
- .4 Grade swales to depth as indicated, providing positive drainage.
- .5 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .6 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:
  - .1 85% under landscaped areas.
- .7 Do not disturb soil within branch spread of trees or shrubs to remain.

**3.3 TESTING**

- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC. Costs of tests will be paid by Departmental Representative. Refer to Section 01 45 00.
- .2 Submit testing procedure, frequency of tests, testing laboratory as designated by ULC or certified testing personnel to Departmental Representative for review.

**3.4 SURPLUS MATERIAL**

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

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT PROCEDURES**

- .1 Payment is included in the balance of the project.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A653/A653M-09, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .2 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
  - .5 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .6 ASTM D751-06, Coated Fabrics.
  - .7 ASTM D1557-09, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
  - .8 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International)
- .1 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-08, Cementitious Materials for Use in Concrete.
  - .2 CSA-A23.1-09/A23.2-09, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
- .4 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
- .1 OPSS 1004 November 2006, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
  - .2 OPSS 1010 April 2004, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

- .3 OPSS 805 November 2010, Ontario Provincial Standard Specification, Construction Specifications for Temporary Erosion and Sediment Control Measures.

### 1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
- .1 Rock: solid material in excess of 0.25 m<sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m<sup>3</sup> bucket. Frozen material not classified as rock.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
- .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
- .1 Weak, chemically unstable, and compressible materials.
- .2 Frost susceptible materials:
- .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
- .2 Table:
- | Sieve Designation | % Passing |
|-------------------|-----------|
| 2.00 mm           | 100       |
| 0.10 mm           | 45 - 100  |
| 0.02 mm           | 10 - 80   |
| 0.005 mm          | 0 - 45    |
- .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

## **1.4 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Quality Control: in accordance with Section 01 45 00:
  - .1 Submit for review by Departmental Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.
  - .2 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
  - .3 Submit to Departmental Representative written notice when bottom of excavation is reached.
  - .4 Submit to Departmental Representative testing inspection results and report as described in PART 3 of this Section.
- .3 Preconstruction Submittals:
  - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
  - .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field clearance record from utility authority location plan of relocated and abandoned services, as required.
- .4 Samples:
  - .1 Submit samples in accordance with Section 01 33 00.
  - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill, unshrinkable fill materials and provide access for sampling.

## **1.5 QUALITY ASSURANCE**

- .1 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.
- .3 Keep design and supporting data on site.
- .4 Engage services of qualified professional Engineer who is registered or licensed in Province of Ontario, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .5 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.
- .6 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
- .2 Divert excess aggregate materials from landfill to local recycling facility for reuse as directed by Departmental Representative.

## **1.7 EXISTING CONDITIONS**

- .1 Buried services:
  - .1 Before commencing work verify and establish location of buried services on and adjacent to site.
  - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
  - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
  - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .5 Prior to beginning excavation Work, notify Departmental Representative and applicable authorities having jurisdiction establish location and state of use of buried utilities and structures. Departmental Representative and authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
  - .6 Confirm locations of buried utilities by careful test excavations.
  - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered and as indicated.
  - .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
  - .9 Record location of maintained, re-routed and abandoned underground lines.
  - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
  - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
  - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
  - .3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

## **Part 2 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .2 Granular material: to Ontario Provincial Standard Specification 1010 for:
- .3 Granular A, maximum size 19.0 mm.
- .4 Granular B, Type II, maximum size 150 mm.
- .5 Sand: clean, washed, minimum 100% passing 4.75 mm sieve, maximum 5% passing 0.075 mm sieve to OPSS 1004.05.04, November 2006.

- .6 Drainage material: 19 mm crushed stone or 19 to 63 mm clean gravel to OPSS 1004.05.07, November 2006.
- .7 Unshrinkable fill: proportioned and mixed to provide:
  - .1 Maximum compressive strength of 0.4 MPa at 28 days.
  - .2 Maximum cement content of 25 kg/m<sup>3</sup> with 40% by volume fly ash replacement: to CAN/CSA-A3001, Type GU.
  - .3 Minimum strength of 0.07 MPa at 24 h.
  - .4 Concrete aggregates: to CAN/CSA-A23.1/A23.2.
  - .5 Cement: Type GU.
  - .6 Slump: 160 to 200 mm.

### **Part 3 3 EXECUTION**

#### **3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Contractor to provide temporary erosion and sedimentation control plan for approval by the Departmental Representative 7 days prior to construction.
- .2 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with OPSS 804 or requirements of authorities having jurisdiction, whichever is more stringent.
- .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### **3.2 SITE PREPARATION**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

#### **3.3 PREPARATION/ PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

- .5 Protect buried services that are required to remain undisturbed.

### **3.4 STRIPPING OF TOPSOIL**

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.
- .2 Strip topsoil to depths as indicated.
  - .1 Do not mix topsoil with subsoil.
- .3 Dispose of unused topsoil off site.

### **3.5 STOCKPILING**

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

### **3.6 DEWATERING AND HEAVE PREVENTION**

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative's review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
  - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 43 to approved collection, runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.
  - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

### **3.7 EXCAVATION**

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as indicated.
- .3 Remove concrete, masonry, paving, walks, demolished foundations and rubble, rock and other obstructions encountered during excavation.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.

- .5 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .6 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material off site.
- .10 Do not obstruct flow of surface drainage or natural watercourses.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .12 Notify Departmental Representative when bottom of excavation is reached.
- .13 Obtain Departmental Representative approval of completed excavation.
- .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .15 Correct unauthorized over-excavation as follows:
  - .1 Fill under bearing surfaces and footings with Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density in accordance with Section 31 05 10.
  - .2 Fill under other areas with Type 2 fill compacted to not less than 95% of corrected Standard Proctor maximum dry density in accordance with Division 32.
- .16 Hand trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
  - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- .17 Install geotextiles in accordance with Section 31 32 21.

### **3.8 FILL TYPES AND COMPACTION**

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained in accordance with Division 32.
  - .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.
  - .2 Within building area: use Type 2 to underside of base course for floor slabs. Compact to 100% of corrected maximum dry density.
  - .3 Under concrete slabs: provide 150 mm compacted thickness base course of Type 1 fill to underside of slab. Compact base course to 100%.

- .4 Place unshrinkable fill in areas as indicated.

### **3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES**

- .1 Place and compact granular material for bedding and surround of existing underground services as directed by Departmental Representative.
- .2 Place bedding and surround material in unfrozen condition.

### **3.10 BACKFILLING**

- .1 Vibratory compaction equipment.
- .2 Do not proceed with backfilling operations until completion of following:
  - .1 Departmental Representative has inspected and approved installations.
  - .2 Departmental Representative has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
  - .4 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .6 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading.
  - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
    - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative or:
    - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

### **3.11 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 20, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as indicated and as directed by Departmental Representative.
- .3 Reinstate lawns to elevation which existed before excavation.
- .4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

- .5 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**

**Part 1          General**

**1.1            DELIVERY AND STORAGE**

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

**1.2            MEASUREMENT AND PAYMENT PROCEDURES**

- .1          All additional Geotextile placement is to be included in the balance of project.

**Part 2          2          PRODUCTS**

**2.1            MATERIAL**

- .1          Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
- .2          Seams: sewn or lapped in accordance with manufacturer's recommendations.
- .3          Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
- .4          Physical properties:
  - .1          Thickness: to CAN/CGSB-148.1-M85, number 3 minimum 3.5 mm.
  - .2          Mass per unit area: to CAN/CGSB-148.1-M85, number 2, minimum 375 g/m.
  - .3          Tensile strength and elongation (in any principal direction): to CAN/CGSB-4.2-90, method 9.2.
    - .1          Tensile strength: minimum 690 N, wet condition.
    - .2          Seam strength: equal to or greater than tensile strength of fabric.
    - .3          Mullen burst strength: to CAN/CGSB-4.2-M88, method 11.1, minimum 2.2 kPa, wet condition.

**Part 3          3          EXECUTION**

**3.1            INSTALLATION**

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

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1    Section 31 05 17 - Aggregate Materials
- .2    Section 32 12 16.01 - Asphalt Paving

**1.2                REFERENCES**

- .1    American Society for Testing and Materials (ASTM)
  - .1    ASTM C 117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .2    ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3    ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4    ASTM D 422-63(1998), Standard Test Method for Particle-Size Analysis of Soils.
  - .5    ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>2</sup>) (600kN-m/m<sup>2</sup>).
  - .6    ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>2</sup>) (2,700kN-m/m<sup>2</sup>).
  - .7    ASTM D 1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .8    ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2    Canadian General Standards Board (CGSB)
  - .1    CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2    CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

**1.3                WASTE MANAGEMENT AND DISPOSAL**

- .1    Separate and recycle waste materials in accordance with Section 01 74 20.
- .2    Divert unused granular material from landfill to local quarry as approved by Departmental Representative.

**1.4                MEASUREMENT AND PAYMENT PROCEDURES**

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

**Part 2            2            PRODUCTS**

**2.1                MATERIALS**

- .1    Granular sub-base material: in accordance with following requirements:

- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Granulars to OPSS 1010

### **Part 3 3 EXECUTION**

#### **3.1 PLACING**

- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

#### **3.2 COMPACTION**

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

#### **3.3 SITE TOLERANCES**

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

#### **3.4 PROTECTION**

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

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section: 32 11 16.01 - Granular Sub-Base.
- .2        Section: 32 12 16.01 - Asphalt Paving.
- .3        Section: 31 05 17 – Aggregate Materials.

**Part 2            2            PRODUCTS**

**2.1                MATERIALS**

- .1        Granular A: to Ontario Provincial Standard Specification 1010.

**Part 3            3            EXECUTION**

**3.1                PLACING**

- .1        Place on a clean surface, properly shaped and compacted and free from snow or ice.
- .2        Place material in layers not exceeding 150 mm when compacted.
- .3        Spread each layer uniformly using approved grading equipment and methods.

**3.2                COMPACTING**

- .1        Compact each layer to minimum 100% Standard Proctor Density.
- .2        Add water as required to maintain material at or near optimum moisture content while compacting.

**3.3                FINISHING**

- .1        Finish compacted surface to within 12 mm of established grade as indicated by a 3 m straightedge placed in any direction
- .2        Correct irregularities greater than 12 mm by loosening the surface and adding or removing material until surface is within specified tolerance.

**3.4                FIELD QUALITY CONTROL**

- .1        The Departmental Representative may perform field and laboratory tests for control of moisture, density and aggregate gradation. Results will control Contractor's operations.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 32 11 16.01 - Granular Sub-base.

**1.2 REFERENCES**

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

**1.3 SAMPLES**

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

**1.4 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.5 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 MATERIALS**

- .1 Aggregates to: OPSS 1010.
  - .1 Granular A.
  - .2 Granular B Type II.
  - .3 Select subgrade.
- .2 Prime coat: SS-1 to OPSS 1103.

- .3 Asphalt concrete: HL-3 and HL-8 to OPSS 1150.
- .4 Asphaltic joint sealant between existing and new asphalt: to ASTM D6690.
- .5 The performance grade of asphalt as per Appendix B, Table A-1 OPSS 1101.
- .6 Traffic paint: Alkyd yellow (505-308) and white (513-301) to CAN/CGSB-1.74 and OPSS 1712.
- .7 Paint thinner: to CAN/CGSB-1.5.

### **Part 3 Execution**

#### **3.1 PAVEMENT THICKNESS**

- .1 As per cross section on detail drawing.

#### **3.2 PAVEMENT CONSTRUCTION**

- .1 Application of tack coat: OPSS 1103. Apply only on clean and dry surface. Paint contact surfaces of curbs, gutters, manholes and like structures with thin, uniform coat of asphalt tack coat material.
- .2 Construction of asphalt concrete: OPSS 310.

#### **3.3 ASPHALT MARKINGS**

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

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 31 05 17 – Aggregate Materials.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C 117-04, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D 260-86(2001), Standard Specification for Boiled Linseed Oil.
  - .4 ASTM D 698-00ae1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>2</sup>) (600 kN-m/m<sup>2</sup>).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-3.3-99(March 2004), Kerosene, Amend. No. 1, National Standard of Canada.
  - .2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

**1.3 DELIVERY, STORAGE AND HANDLING**

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

**1.4 MEASUREMENT PROCEDURES**

- .1 Included in balance of project.

**Part 2 2 PRODUCTS**

**2.1 MATERIALS**

- .1 Concrete mixes and materials: in accordance with Section 03 30 00.01 - Cast-in-Place Concrete.
- .2 Granular base: Granular A material as per Section 32 11 16.01 Granular Sub-Base requirements.
- .3 Kerosene: to CAN/CGSB-3.3.
- .4 Burlap: in accordance with OPSS 1306 for concrete protection during curing.

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**Part 3            3            EXECUTION**

**3.1                GRADE PREPARATION**

- .1 Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Construct embankments using excavated material free from organic matter or other objectionable materials.
- .3 When constructing embankment provide for minimum 0.6 m shoulders, where applicable, outside of neat lines of concrete.
- .4 Place fill in maximum 150 mm layers and compact to at least 95 % of maximum dry density to ASTM D 698.

**3.2                GRANULAR BASE**

- .1 Obtain Departmental Representative's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated.
- .3 Compact granular base in maximum 150 mm layers to at least 95 % of maximum density to ASTM D 698.

**3.3                CONCRETE**

- .1 Obtain Departmental Representative's approval of granular base prior to placing concrete.
- .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .4 Provide edging as indicated with 10 mm radius edging tool.
- .5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Departmental Representative can be demonstrated. Hand finish surfaces when directed by Departmental Representative.

**3.4                TOLERANCES**

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

**3.5                EXPANSION AND CONTRACTION JOINTS**

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

**3.6                ISOLATION JOINTS**

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

- .2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Seal isolation joints with sealant approved by Departmental Representative.

### **3.7 CURING**

- .1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound as directed by Departmental Representative.
- .2 Burlap is to be used for moist curing. Place two pre-wetted layers on concrete surface and keep continuously wet during curing period. Burlap as per OPSS 1306.
- .3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

### **3.8 BACKFILL**

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

### **3.9 CLEANING**

- .1 Proceed in accordance with Section 01 74 20 - Project Waste Management.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            31 23 33.01 - Excavation, Trenching and Backfilling.

**1.2                REFERENCES**

- .1            Agriculture and Agri-Food Canada
  - .1            The Canadian System of Soil Classification, Third Edition, 1998.
- .2            Canadian Council of Ministers of the Environment
  - .1            PN1340-2005, Guidelines for Compost Quality.
- .3            .1 OPSS 2501
  - .1            OPSS 802

**1.3                MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.4                WASTE MANAGEMENT AND WASTE DISPOSAL**

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

**Part 2            2            PRODUCTS**

**2.1                TOPSOIL**

- .1            Topsoil for sodded areas as per OPSS 802.
- .2            All topsoil will be screened prior to placement. Topsoil will pass through a 25mm screen.

**2.2                SOIL AMENDMENTS**

- .1            Fertilizer:
  - .1            Fertility: major soil nutrients present in following amounts:
  - .2            Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
  - .3            Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
  - .4            Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
  - .5            Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
  - .6            Ph value: 6.5 to 8.0.
- .2            Sand: washed coarse silica sand, medium to coarse textured.
- .3            Organic matter: compost in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

- .4 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.
- .5 Limestone:
  - .1 Ground agricultural limestone.
- .6 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

### **2.3 SOURCE QUALITY CONTROL**

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

## **Part 3 3 EXECUTION**

### **3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan.
- .2 .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 STRIPPING OF TOPSOIL**

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

### **3.3 PREPARATION OF EXISTING GRADE**

- .1 Verify that grades are correct.
  - .1 If discrepancies occur, notify Department Representative and do not commence work until instructed by Department Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials.
  - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
  - .2 Remove debris which protrudes more than 75 mm above surface.
  - .3 Dispose of removed material off site.

- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

### **3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL**

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

### **3.5 FINISH GRADING**

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by a Department Representative.
  - .1 Leave surfaces smooth, uniform and firm against deep foot printing.

### **3.6 ACCEPTANCE**

- .1 Department Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

### **3.7 SURPLUS MATERIAL**

- .1 Dispose of surplus material off site.

### **3.8 CLEANING**

- .1 Proceed in accordance with Section 01 74 20.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01 74 20 - Construction/Demolition Waste Management and Disposal.
- .2        Section 32 91 19.13 - Topsoil Placement and Grading.

**1.2                SCHEDULING**

- .1        Schedule sod laying to coincide with preparation of soil surface. Sod to be applied immediately after topsoil surface is ready and accepted.
- .2        Schedule sod installation when frost is not present in ground.

**1.3                MEASUREMENT PROCEDURES**

- .1        Included in Balance of Project.

**1.4                WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2            2            PRODUCTS**

**2.1                MATERIALS**

- .1        Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
  - .1        Turf Grass Nursery Sod types:
    - .1        Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.
    - .2        Turf Grass Nursery Sod quality:
      - .1        Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.
      - .2        Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
      - .3        Mowing height limit: 35 to 65 mm.
      - .4        Soil portion of sod: 6 to 15 mm in thickness.
  - .2        Water:
    - .1        Supplied by contractor via off-site source.
  - .3        Fertilizer:
    - .1        To Canada "Fertilizers Act" and "Fertilizers Regulations".

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

## **2.2 SOURCE QUALITY CONTROL**

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

## **Part 3 3 EXECUTION**

### **3.1 PREPARATION**

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Department Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Fine grade surface free of humps and hollows to smooth, even grade, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod, surface to drain naturally.
- .4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site.

### **3.2 SOD PLACEMENT**

- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .3 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

### **3.3 SOD PLACEMENT ON SLOPES AND PEGGING**

- .1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.
- .2 Start laying sod at bottom of slopes.
- .3 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to following pattern:
  - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
  - .2 Not less than 3-6 pegs per square metre.
  - .3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by. Departmental Representative.4 Drive pegs to 20 mm above soil surface of sod sections.

**3.4 MAINTENANCE DURING ESTABLISHMENT PERIOD**

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

**3.5 ACCEPTANCE**

- .1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
  - .1 Sodded areas are properly established.
  - .2 Sod is free of bare and dead spots.
  - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

**3.6 MAINTENANCE DURING WARRANTY PERIOD**

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

**3.7 CLEANING**

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

**END OF SECTION**