Public Works and Government Services Canada

MERX I.D. No. **EZ899-171065/A**

SPECIFICATIONS
For
CBSA IPIL-RFID, Douglas & Pacific Highway
Port of Entry
Surrey, BC
Project No. R.081242.001 July 2016

APPROVED BY:

2016-07-21
Regional Manager, A&E Services Date

2016-07-06.
Construction Safety Coordinator Date

TENDER:

2016-07-21
Project Manager Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
#641 B 800 Burrard Street, Vancouver, B.C. V6Z 2V8

Division 33 – Utilities

Drawing List

CONSULTANTS – SEAL & SIGNATURE

Discipline	Seal / Signature / Date
Electrical (Prime)	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA B. LEGAARE #40123 JUL 20 2016
Civil (Sub)	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA L. KRAL #27661 JUN 22 2016

END OF SECTION

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this contract comprises of:

Providing electrical raceways (conduits/junction boxes) for power and signal circuits, associated with primary inspection lanes (PIL) at both Pacific Highway and Douglas Ports of Entry (POE) in Surrey, BC.

Providing posts and concrete work and trenching associated with the installation of electrical conduits. Also roadworks and median installation.

Lane/PIL booths 304, 305 & 306 in Pacific Highway POE and Lane/PIL booths #1, #2, & #3 in Douglas POE. These will be equipped with LPR/RFID hardware.

The sites are located at:

Pacific Highway Border Crossing: 220 Highway 99, Surrey, BC

Douglas Border Crossing: 28-176th Street, Surrey, BC

.2 Perform all work in accordance with National Building Code of Canada (NBC) 2005, WorkSafeBC/Workers' Compensation Board (WCB) Regulations and these Contract Documents. Where there is a conflict between Contract Documents and referenced standards, the most stringent will be applied.

1.2 CONTRACT METHOD

.1 Construct the Work under a single lump sum fixed price contract. Mobilization and demobilization, preparatory works and operations for all items under the Contract, including but not limited to those necessary for the aforementioned tasks and those indicated on the drawings shall be considered incidental to the work performed under the Contract. The lump sum payment shall constitute full compensation for furnishing all plant, labour, materials and equipment and performing any associated quality control, reports, environmental protection and meeting safety requirements.

1.3 WORK SEQUENCE

.1 Co-ordinate with progress schedule described in Section 01 32 17 - Construction Progress Schedule.

1.4 USE OF SITE

.1 Limit use of premises for Work, for storage and for access to allow for continuous use of site by public and CBSA Staff.

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

.3 Assume full responsibility for protection and safekeeping of Products under this Contract.

.4 Do not use any other part of property unless approved in writing by the Departmental Representative.

.5 Store materials and equipment only where directed by the Departmental Representative. Obtain and pay for use of additional storage and work areas if required.

.6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.7 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work.

.8 Condition of existing work at completion of operations to be equal to or better than that which existed before new work started.

.9 Provide necessary protection and hoarding to prevent unauthorized entry into areas of work at all times by staff and public.

.10 Inform the Departmental Representative 4 working days prior to performing work inside any building. Entry into areas of work will be by authorized personnel only and must be delineated during execution of work.

The site is open to the public 24 hours a day. For the daily period from 10:00 am to 17:00 pm, the Departmental Representative will work with the Contractor so that both public access and construction can occur at the site.

1.5 REQUIREMENTS FOR OCCUPIED BUILDINGS

.1 Adjacent portions of building and other booths will remain in use during Work.

.2 Co-operate with the Departmental Representative by scheduling operations to minimize conflict and to facilitate continuous use of building. Do not impede, restrict or obstruct use of building or adjacent portions of property.

.3 Do work in a manner that will minimize creation of noise that would disturb day-to-day operation of building and adjacent property.

.4 Locate stationary noise generating equipment as far away as practical from occupied parts of building, or where directed by the Departmental Representative.

.5 Co-ordinate with the Departmental Representative for necessary shutdown of services affecting occupied parts of building and adjacent property where serviced from building. Provide 72 hours of notice prior to shutdown. Minimize occurrences and durations of shutdowns.

.6 Co-ordinate with the Departmental Representative to ensure that construction activities do not compromise security of building and the adjacent booths.

.7 Ensure that construction activities do not compromise other active systems within the building.

1.6 SMOKING POLICY

.1 Smoking is NOT permitted on this site.

1.7 PROJECT MEETINGS

.1 The Departmental Representative will arrange project meetings and assume responsibility for setting times, recording and distributing minutes.

1.8 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING LANES/BOOTHS

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

.2 Where security has been reduced by work of Contract, provide temporary means to maintain security.

.3 Provide temporary dust screens, barriers, warning signs in locations where renovation and alteration work is adjacent to areas used by public or government staff.

.4 Protect adjacent surfaces. Make good or replace damaged surfaces and equipment to satisfaction of the Departmental Representative, at no cost to Contract.

.5 Provide barricade warning tape to mark perimeter of work area, as directed by the Departmental Representative.

1.9 ADDITIONAL DRAWINGS

.1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 CODES

.1 Perform work to CURRENT Codes, Construction Standards and Bylaws, including Amendments up to the TENDER closing date.

1.2 DESCRIPTION OF ELECTRICAL WORK

.1 Work under this contract covers both sites, ie. Pacific Highway and Douglas Crossings.

.2 Work to be performed under this contract for:

a.) From Camera Post to Booth:

.1 All existing junction boxes to be removed and replaced with new junction boxes.

.2 Separate junction boxes for power and for signal circuits.

.3 Junction boxes to be PVC, 152 mm x 152 mm x 103 mm.

.4 The two junction boxes to be mounted on the opposite sides of the respective post.

.5 Any entering and exiting conduit at the junction box location to be suitably re-positioned and liquid-lite flexible conduit installed at the junction boxes to provide continuity.

.6 Provide 1.8 m of coiled power conductors associated with the power junction boxes.

.7 Signal cables will be supplied and installed by others. Provide continuous pull string in the signal conduits.

b.) From Camera Post to beyond:

.1 Provide all new power and signal conduits.

.2 All conduits to be minimum 27mm diameter. Underground conduits to be RPVC. Above ground conduits, surface mounted along the concrete curbs, to be RGS.

.3 All new posts required.

.4 All new junction boxes (for power + signal) required.

.5 120 V, power conductors, #12 AWG copper in the power conduits installation colour to be as per drawings.

.6 Provide 1.8 m of coiled power conductor associated with the power junction boxes.

.7 Signal cables will be supplied and installed by others. Provide continuous pull string in the signal conduits.

1.3 DESCRIPTION OF CIVIL WORK

.1 Work under this Contract covers the installation of trenches for conduits and roadwork posts and medians installed at Douglas and Pacific Port of Entry.

.2 Work to be performed under this contract:

- .1 Provide traffic control as per Departmental Representative.
- .2 Confirm location of existing services for Trenching and Roadworks installation.
- .3 Install conduits as per civil drawings and specifications in accordance with electrical design.
- .4 Install roadworks posts and median installations as per Civil drawings and specifications.
- .5 Contact Departmental Representative regarding scheduling of work, traffic control, erosion and dust control or if any potential problem or incident occurs. If any conflict arises – immediately contact Departmental Representative and provide remediation as per requirements and approval by the Departmental Representative.

1.4 CONTRACT DOCUMENTS

.1 Contract documents, drawings and specifications are intended to complement each other and to provide for and include everything necessary for completion of work.

.2 Drawings are, in general, diagrammatic and are intended to indicate scope and general arrangement of work.

1.5 DIVISION OF SPECIFICATIONS

.1 Specifications are subdivided in accordance with current 6-digit National Master Specifications System.

.2 A division may consist of the work of more than one subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.

.3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.6 TIME OF COMPLETION

.1 Commence work immediately upon official notification of acceptance of offer and complete all contract work within six (6) weeks after contract award. If contract is awarded earlier than September long weekend, the construction is to start after that.

1.7 WORK RESTRICTIONS

.1 Use of Site and Facilities.

.1 Execute work with least possible interference or disturbance to the normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Do not disrupt existing services at the site.

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

.4 Maintain fire access/control.

.5 Provide own sanitary facilities. Keep facilities clean.

.6 Parking to be off-site only. On-site parking only if accepted by Departmental Representative.

.2 Special Scheduling Requirements.

.1 Refer to section 01 14 00, subsection 1.3.

.2 Give the Departmental Representative 48 hours notice for work to be carried out during "off hours".

.3 Delivery of materials to be coordinated with Departmental Representative.

.4 Schedule and execute work with least possible interference and disturbance to the normal use of the Border Lane Control.

1.8 CONSTRUCTION PROGRESS SCHEDULE

.1 Carry on work as follows:

.1 Within 10 working days after Contract award, provide "phasing bar chart" and schedule showing anticipated progress stages and final completion of work within time period required by Contract documents. Indicate following:

.1 Submission of shop drawings, product data, MSDS sheets and samples.

.2 Commencement and completion of work of each section of specifications or trade for each phase as outlined.

.3 Final completion date within time period required by Contract documents.

.2 Do not change approved Schedule - without notifying Departmental Representative.

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.9 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of Contract lump sum prices in detail as directed by Departmental Representative and aggregating Contract price.

1.10 CODES, BYLAWS, STANDARDS

.1 Perform work in accordance with Canadian Electrical Code Part 1, 2015 Edition and other relevant Codes, Construction Standards and/or any other Code or Bylaw of local application.

.2 Comply with applicable local bylaws, rules and regulations enforced at location concerned.

.3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.

.4 In any case of conflict or discrepancy, the most stringent requirements will apply.

1.11 DOCUMENTS REQUIRED

.1 Maintain 1 copy each of following at job site:
- .1 Contract drawings.
- .2 Contract specifications.
- .3 Addenda to Contract documents.
- .4 Copy of approved work schedule.
- .5 Reviewed/approved shop drawings.
- .6 Change orders.
- .7 Other modifications to Contract.
- .8 Field test reports.
- .9 Reviewed samples.
- .10 Manufacturer installation and application instructions.
- .11 One set of record drawings and specifications for record purposes.
- .12 Current construction standards of workmanship listed in technical Sections.
- .13 Contractor's Company Health and Safety and the Site Specific Safety Plans.
- .14 Site safety plan
- .15 Permits
- .16 WHMIS documents

1.12 REGULATORY REQUIREMENTS

.1 Building permit submission is not required. Obtain and pay for any other Permits, Certificates, Licenses that may be required by regulatory municipal, provincial or federal authorities to complete the work.

.2 Provide inspection authorities with plans and information required for issue of acceptance certificates.

.3 Furnish inspection certificates in evidence that work installed conforms with requirements of authority having jurisdiction.

1.13 TAXES

.1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

1.14 CONTRACTOR USE OF SITE

.1 Use of site:
  .1 Adjacent portions of site will remain occupied during work.
  .2 Co-ordinate use of site under direction of Departmental Representative to minimize disruption of occupied building and public used portions of site.

.2 Perform work in accordance with Contract documents. Ensure that work is carried out in accordance with phasing where applicable.

.3 Do not unreasonably encumber site with material or equipment.

1.15 EXAMINATION

.1 Examine site and be familiar and conversant with existing conditions likely to affect work.

1.16 EXISTING SERVICES

.1 Where work involves breaking into or connecting to existing services, carry out work at times approved by Departmental Representative to minimize inconvenience to existing facilities that are to remain occupied during work.

1.17 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and in accordance with manufacturer recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain his approval for actual locations.

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

1.18 SETTING OUT OF WORK

.1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.2 Provide devices needed to lay out and construct work.

.3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

1.19 QUALITY OF WORK

.1 Ensure that quality workmanship is performed through use of skilled trade workers, under supervision of qualified journeyman.

.2 Workmanship, erection methods and procedures to meet minimum standards set out in specifications, drawings and applicable codes and standards.

.3 In cases of dispute, decisions as to standard or quality of work rest solely with Departmental Representative, whose decision is final.

1.20 WORKS CO-ORDINATION

.1 Co-ordinate work of sub-trades

.1 Designate one person to be responsible for review of contract documents and shop drawings and managing co-ordination of Work.

.2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.

.1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.

.2 Develop co-ordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.

.1 Pay particular close attention to overhead work above ceilings and within or near to building structural elements.

.2 Identify on co-ordination drawings, building elements, service lines, rough-in points and indicate location services entrance to site.

.3 Facilitate meeting and review co-ordination drawings. Ensure that subcontractors agree and sign off on drawings.

.4 Publish minutes of each meeting.

.5 Plan and co-ordinate work in such a way to minimize quantity of service line offsets.

.6 Submit copy of co-ordination drawings and meeting minutes to Departmental Representative for information purposes.

.3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after co-ordination meeting for such items has taken place.

.4 Work co-ordination:

.1 Ensure co-operation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.

.2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.

.3 Ensure disputes between subcontractors are resolved.

.5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to co-ordinate Work.

1.21 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 In accordance with Section 01 33 00 – Submittal Procedures, submit requested shop drawings, product data, MSDS sheets and samples indicated in each technical Section.

.2 Allow sufficient time for following:

.1 Review of product data.

.2 Approval of shop drawings.

.3 Review of re-submission.

.4 Ordering of approved material and/or products.

1.22 PROJECT MEETINGS

.1 These will be as per section 01 11 00 subsection 1.7.1.

.2 Start-up Meeting.

.1 Convene start-up meeting maximum 1 week after official award of contract. Key contractor personnel, contractor site supervisor, Departmental Representative to attend.

.2 Establish time and location of meeting and notify parties concerned minimum 7 days before meeting.

.3 Site Review by Departmental Representatives.

.1 Provide access at all times for site visits, site review by Departmental Representatives.

.4 Regular Project Meetings.

.1 Hold project meetings every 2 weeks.

.2 Key contractor personnel, contractor site supervisor, Departmental Representative, Parks Representatives to attend.

.3 Notify parties minimum 3 days prior to meetings.

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

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Use of Site, Safety and Security

.4 Field observations, Site Reviews,

.5 Review of delivery schedules.

.6 Upcoming work and any Revisions to construction schedule.

.7 Review of submittal schedules: expedite as required.

.8 Review of any proposed changes for affect on construction schedule and on completion date.

1.23 RECORD DOCUMENTS

.1 The Departmental Representative will provide 4 sets of drawings and 2 sets of specifications and PDF files, including 2 sets of drawings and specification and original AutoCAD files for "as-built" purposes.

.2 Keep one set of current white prints of all contract drawings and all addenda, revisions, clarifications, change orders, and reviewed shop drawings in the site office; and have them available at all times for inspection by the Consultant.

.3 As the work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.

.5 At completion of the Work, transfer all deviations, including those called up by addenda, revisions, clarifications, shop drawings and change order, to a set of Issued for Construction drawings. Submit for review neat and clear red-line as-built drawings. Red-line as-built drawings must includ exact routing of conduits and the circuit number for power conductors for each lane.

.6 Refer to Section 01 78 00 – Close-out Submittals.

1.24 CLEANING

.1 Daily conduct cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.

.2 Ensure clean-up of work areas each day after completion of work.

.3 Clean interior building areas when ready to receive finish painting and continue cleaning on an as-needed basis until building is sufficiently completed or ready for occupancy.

.4 Clean exterior building areas.
- .1 Remove dirt and other disfiguration from exterior surfaces including roof and roof gutters.
- .2 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .3 Sweep and wash clean paved areas and all pavement parking/storage areas used by Contractor to remove all traces of construction spillage, stains and residue. Do not blast dirty water onto adjacent buildings and site features.

.5 In preparation for interim and final inspections:
- .1 Examine all sight-exposed interior and exterior surfaced and concealed spaces.
- .2 Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces, including glass and other polished surfaces.

.6 Use cleaning materials and methods in accordance with instructions of manufacturer of surface to be cleaned.

1.25 SITE SECURITY

.1 Be responsible for construction yard and work area security.

1.26 DUST CONTROL

.1 Provide temporary dust tight screens or partitions to localize dust generating activities and for protection of workers, finished areas of work, adjacent areas and public.

1.27 ENVIRONMENTAL PROTECTION

.1 Prevent extraneous materials from contaminating air beyond construction area, by

providing temporary enclosures during work.

.2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.

.3 Ensure proper disposal procedures in accordance with all applicable provincial regulations.

1.28 ADDITIONAL DRAWINGS

.1 Departmental Representative may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.

.2 Upon request, Departmental Representative may furnish up to a maximum of 10 sets of Contract documents for use by Contractor at no additional cost. Should more than 10 sets of documents be required Departmental Representative will provide them at additional cost.

1.29 BUILDING SMOKING ENVIRONMENT

.1 Do not smoke within building.

1.30 SYSTEM OF MEASUREMENT

.1 Metric system of measurement (SI) will be employed on this Contract.

1.31 SITE VISIT

.1 The bidding Contractors are strongly encouraged to visit the site prior to bid submittal to examine closely any local and existing conditions likely to affect the cost of work.

.2 Arrangement for site visit will be made with PWGSC during tender period.

.3 The bidding Contractors are expected to examine the site in detail to determine the specific work required to complete the Contract.

1.32 SUBMISSION OF TENDER

.1 Submission of tender is deemed to be confirmation of the fact that the Tenderer has analysed the Contract documents and inspected the site and is fully conversant with all conditions.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 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 scaffolding independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

.2 Coordinate construction, staff and delivery vehicles accessing contractor's lay-down area with CBSA Facility Personnel to minimize disturbance to ongoing CBSA operations.

.3 All deliveries and construction vehicle access which require escort services against PIL and SIA/TIA traffic will require a minimum of 24 hours notice to Departmental Representative so that an escort may be arranged.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

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

.3 Where security is reduced by work provide temporary means to maintain security as approved by Departmental Representative.

.4 Refer to Section 01 52 00 – Construction Facilities for sanitary facility requirements.

.5 Protection: protect work temporarily until re-coating work is completed.

1.3 HOURS OF WORK

.1 The Port of Entry is operational 24 hours per day, 7 days a week. Contractor to submit proposed hours-of-work to Departmental Representative for review and approval.

.2 Disruptive construction noise and operations may require work to be executed during low Port of Entry volume periods. Low volume hours are typically Sundays and Monday to Friday between 08:00 - 14:00 and to be confirmed by Departmental Representative.

.3 Should there be need for interruption to operational equipment, Contractor shall give 72 hours notice to Departmental Representative. Request shall be subject to CBSA approval of date and time, and may require that said work be completed outside of normal working hours.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises.

.2 Protect all existing structures, surfaces and finishes. Repair or make good to better condition any damage to existing finishes.

.3 Any work which impacts the operations onsite (traffic, commercial, support staff, etc.) must have one (1) week notice and must be approved by CBSA and Departmental Representative. CBSA maintains the right to have work completed at low volume periods (after hours such as 22:00 – 06:00 on weekdays).

.4 Any work which impacts the flow of traffic (bus, regular passengers or trucks) must be approved by CBSA and must have two (2) weeks notice.

1.5 EXISTING SERVICES

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

.2 Provide for personnel, pedestrian and vehicular traffic.

.3 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.4 Contractor will not be allowed to connect to Owner's existing data and communication services for his own use.

1.6 SPECIAL REQUIREMENTS

.1 Traffic lane closures:
- .1 Request for lane closure requires a minimum of two (2) weeks notice and must be approved by Departmental Representative. During lane closure, provide wayfinding signage for pedestrian and vehicular traffic.

.2 Scheduling of work:
- .1 Work closely with Departmental Representative and other contractors hired directly by CBSA who will be responsible for installation of signal wiring and IPIL/RFID devices. Schedule the work in coordination with Departmental Representative and CBSA Contractors and note that existing systems have to remain in operation until all new electrical and civil work beyond camera posts is completed.

.3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.4 Keep within limits of work and avenues of ingress and egress.

.5 Noise Generation:
- .1 Means and procedures of controlling and isolating other excessive or disturbing noise and vibration affecting occupied areas shall be the responsibility of the Contractor and approved by the Departmental Representative and CBSA.

.6 Deliver materials outside of peak traffic hours, typically 17:00 to 07:00 and 13:00 to 15:00 and to be confirmed by Departmental Representative.

1.7 SECURITY

.1 Obey the following CBSA Security Directives:
- .1 Contractor's Site Superintendent shall sign out a Contractor pass for each construction crew member at the start of the project. Wear pass visibly at all times while on CBSA property. Surrender pass to designated CBSA official at the end of the project. Replacement costs of $100 per pass shall be assessed against the Contractor for any passes lost during the course of the project.

.2 Contractor's personnel shall be in possession of Government issued picture identification at all times while on CBSA property.

.3 Remain within the designated work areas. Movement within CBSA restricted areas must be approved and may require to be escorted by CBSA staff.

.4 Do not interfere with Port of Entry inspection processes. Move away from CBSA officials interacting with the travelling public to avoid overhearing potentially sensitive and personal conversations.

.5 Be accountable for tools/equipment at all times. Do not leave tools unattended and/or within reach of the travelling public.

.6 Act professionally at all times. No foul language or rude behavior.

.7 Do not interact with the travelling public, unless authorized to do so where required.

.8 Obey uniformed CBSA officers when given operational directives (these may include being instructed to move off site during a dangerous situation or to stop work because of operational requirements. Report to the Departmental Representative when such instructions have been given, as early as is convenient). Do not take directions from uniformed officers of PWGSC building maintenance regarding project construction issues.

1.8 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 SCHEDULES REQUIRED

.1 Submit schedules as follows.

- .1 Construction progress schedule.
- .2 Submittal schedule for shop drawings and product data.
- .3 Product delivery schedule.

1.2 FORMAT

.1 Prepare schedule in form of horizontal bar chart (GANTT).

.2 Provide a separate bar for each major item of work, trade or operation.

.3 Provide horizontal time scale identifying first work day of each week.

.4 Format for listings: chronological order of start of each item of work.

.5 Identification of listings: by Specification subjects or system descriptions.

1.3 SUBMISSION

.1 Submit initial schedule within 1 working days after award of Contract.

.2 Submit minimum of 3 copies to be retained by the Departmental Representative.

.3 The Departmental Representative will review schedule and return review copy within 7 working days after receipt.

.4 Re-submit finalized schedule within 3 working days after return of review copy.

.5 Submit revised progress schedule with each application for payment.

.6 Distribute copies of revised schedule to:

- .1 Subcontractors.
- .2 Other concerned parties.

.7 Instruct recipients to report to Contractor within 5 working days, any problems anticipated by timetable shown in schedule.

1.4 SCHEDULING

.1 Include complete sequence of construction activities.

.2 Include dates for commencement and completion of each major element of construction as follows.

.3 Show projected percentage of completion of each item as of first day of week.

.4 Indicate progress of each activity to date of submission schedule.

.5 Show changes occurring since previous submission of schedule:

.1 Major changes in scope.
.2 Activities modified since previous submission.
.3 Revised projections of progress and completion.
.4 Other identifiable changes.

.6 Provide a narrative report to define:

.1 Problem areas, anticipated delays and impact on schedule.
.2 Corrective action recommended and its effect.

1.5 PROGRESS REPORTS

.1 Maintain accurate record of the progress of the Work. Submit progress reports at times requested by the Departmental Representative.

.2 Include in reports dates of commencement and percentage of work completed for different parts of the Work.

1.6 STAFFING AND OVERTIME

.1 Cease work at any particular point and transfer workers to other designated points, when so directed, should the Departmental Representative judge it necessary to expedite the Work.

.2 Should the Work fail to progress according to the approved progress schedule, work such additional time (including weekends and holidays), employ additional workers, or both, as may be required to bring the Work back on schedule, at no additional cost to Contract.

1.7 SUBMITTALS SCHEDULE

.1 Include schedule for submitting shop drawings, product data and samples.

.2 Indicate dates for submitting, review time, re-submission time, last date for meeting fabrication schedule.

.3 Include dates when reviewed submittals will be required from the Departmental Representative.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 APPROVALS

.1 Approval of shop drawings and samples: refer to Section 01 11 55 - General Instructions.

2.1 GENERAL

.1 This Section specifies general requirements and procedures for Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections.

.2 Present shop drawings, product data and samples in SI Metric units.

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

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

.5 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract documents and stating reasons for deviations.

.6 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by Departmental Representative's review of submission unless Departmental Representative gives written acceptance of specific deviations.

.7 Make any changes in submissions which Departmental Representative may require consistent with Contract documents and resubmit as directed by Departmental Representative.

.8 Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative.

.9 Do not proceed with work until relevant submissions are reviewed and approved by Departmental Representative.

3.1 SUBMISSION REQUIREMENTS

.1 Co-ordinate each submission with requirements of work and Contract documents. Individual submissions will not be reviewed until all related information is available.

.2 Allow 10 working days for Departmental Representative's review of each submission, unless noted otherwise.

.3 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.

.4 Submissions to 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.

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

4.1 SHOP DRAWINGS

.1 Shop drawings: original drawings or modified standard drawings provided by Contractor to illustrate details of portion of work which are specific to project requirements.

.2 Maximum sheet size: 850 x 1050 mm.

.3 Submit 6 prints of shop drawings for each requirement requested in specification sections and/or as requested by Departmental Representative.

.4 Cross-reference shop drawing information to applicable portions of Contract documents.

5.1 SHOP DRAWINGS REVIEW

.1 Review of shop drawings by Department Representative is for the sole purpose of ascertaining conformance with the general concept.

.2 This review will not mean the Department Representative approves detail design inherent in shop drawings, responsibility for which remains with Contractor submitting same.

.3 This review will not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract documents.

.4 Without restricting the generality of the foregoing, Contractor is responsible for:
- .1 Dimensions to be confirmed and correlated at job site.

.2 Information that pertains solely to fabrication processes or to techniques of construction and installation.

.3 Co-ordination of work of all sub-trades.

6.1 PRODUCT DATA

.1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.

.2 Delete information not applicable to project.

.3 Supplement standard information to provide details applicable to project.

.4 Cross-reference product data information to applicable portions of Contract documents.

.5 Submit 6 copies of product data.

7.1 SAMPLES

.1 Samples: examples of materials, equipment, quality, finishes and workmanship.

.2 Where colour, pattern or texture is a criterion, submit a full range of samples.

.3 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.

8.1 PROGRESS SCHEDULE

.1 Submit work schedule and cost breakdown as required in Section 01 11 55 - General Instructions.

9.1 SUSTAINABLE (GREEN) REQUIREMENTS SUBMITTALS

.1 Provide submittals to show compliance with waste management and disposal requirements in accordance with Section 01 74 19 – Construction/Demolition Waste Management and Disposal.

.2 Submit 6 copies of documentation.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

PSPCC Update on Asbestos Use
Effective April 1, 2016, all Public Works and Government Services Canada (PWGSC) contracts for new construction and major rehabilitation will prohibit the use of asbestos-containing materials. Further information can be found at http://www.tpsgc-pwgsc.gc.ca/comm/vedette-features/2016-04-19-00-eng.html

1.1 REFERENCES

.1 Government of Canada.
- .1 Canada Labour Code - Part II
- .2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada (NBC):
- .1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 The Canadian Electric Code (as amended)

.4 Canadian Standards Association (CSA) as amended:
- .1 CSA Z797-2009 Code of Practice for Access Scaffold
- .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes
- .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
- .4 CSA Z1006-10 Management of Work in Confined Spaces.
- .5 CSA Z462- Workplace Electrical Safety Standard

.5 National Fire Code of Canada 2010 (as amended)
- .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.

.6 American National Standards Institute (ANSI):
- .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.7 Province of British Columbia:
- .1 Workers Compensation Act Part 3-Occupational Health and Safety.
- .2 Occupational Health and Safety Regulations

1.2 RELATED SECTIONS

.1 Refer to the following current NMS sections as required:

.1	Construction progress schedules:	Section 01 32 18
.2	Submittals procedures:	Section 01 33 00
.3	Temporary utilities:	Section 01 51 00
.4	Temporary barriers and enclosures:	Section 01 56 00

1.3 WORKERS' COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 COMPLIANCE WITH REGULATIONS

.1 PSPC may terminate the Contract without liability to PSPC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review in accordance with Section 013300

.2 Work effected by submittal shall not proceed until review is complete.

.3 Submit the following:
- .1 Site Specific Health and Safety Plan.
- .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .3 Copies of incident and accident reports.
- .4 Complete set of current Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- 5 Emergency Procedures.

.4 The Departmental Representative will review the Contractor's Site Specific Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.5 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.

.6 Submission of the Site Specific Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
- .1 Be construed to imply approval by the Departmental Representative.
- .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
- .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 RESPONSIBILITY

.1 Assume responsibility as the Prime Contractor for work under this contract.

.2 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.

.3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with Site Specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

.1 The Health and Safety Coordinator:
- .1 Be responsible for completing all health and safety training and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

.2 Be responsible for implementing, revising, daily enforcing, and monitoring the Site Specific Health and Safety Plan.

.3 Be on site during execution of work.

1.8 GENERAL CONDITIONS

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
- .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
- .2 Secure site at night time or provide security guard as deemed necessary to protect site against entry.

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
- .1 Multi-employer work site.
- .2 Federal employees and general public.
- .3 Energized electrical services.
- .4 Working from heights
- .5 Working in the open exposed to unpredictable weather.
- .6 High volumes of vehicular and pedestrian traffic

1.10 UTILITY CLEARANCES

.1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work.

.2 The Contractor will not rely solely upon the Reference Drawings or other information provided for utility locations.

1.11 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

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

1.11 WORK PERMITS

.1 Obtain speciality permit(s) related to project before start of work.

1.12 FILING OF NOTICE

.1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to the Departmental Representative.

1.13 HEALTH AND SAFETY PLAN

.1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.
.2 Identification of applicable compliance obligations.
.3 Definition of responsibilities for project safety/organization chart for project.
.4 General safety rules for project.
.5 Job-specific safe work procedures.
.6 Inspection policy and procedures.
.7 Incident reporting and investigation policy and Procedures.
.8 Occupational Health and Safety Committee/Representative procedures.
.9 Occupational Health and Safety meetings.
.10 Occupational Health and Safety communications and record keeping procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work.

.4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Site Specific Health and Safety Plan by Public Service and Procurement Canada (PSPC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.14 EMERGENCY PROCEDURS

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
- .1 Designated personnel from own company.
- .2 Regulatory agencies applicable to work and as per legislated regulations.
- .3 Local emergency resources.
- .4 Departmental Representative.

.2 Include the following provisions in the emergency procedures:
- .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
- .2 Evacuate all workers safely.
- .3 Check and confirm the safe evacuation of all workers.
- .4 Notify the fire department or other emergency responders.
- .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
- .6 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:
- .1 Work at high angles.
- .2 Work in confined spaces or where there is a risk of entrapment.
- .3 Work with hazardous substances.
- .4 Underground work.
- .5 Work on, over, under and adjacent to water.
- .6 Workplaces where there are persons who require physical assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

1.15 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00.

.2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.

.3 Provide adequate means of ventilation in accordance with Section 01 51 00.

.4 The contractor shall ensure that the product is applied as per manufacturers recommendations.

.5 The contractor shall ensure that only pre-approved products are brought onto the work site in an adequate quantity to complete the work.

1.16 ASBESTOS HAZARD

.1 Carry out any activities involving asbestos in accordance with applicable Provincial Regulations.

.2 Removal and handling of asbestos will be performed as indicated in NMS Sections 02 41 16 and 02 82 10 and 02 82 11 and 02 82 12.

1.17 PCB REMOVALS

.1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.

.2 Remove, handle, transport and dispose of as indicated in NMS Section 02 8 00.

1.18 REMOVAL OF LEAD CONTAINING PAINTS

.1 All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.

.2 Carry out demolition activities involving lead-containing paints in accordance with applicable Provincial Regulations.

1.19 ELECTRICAL SAFETY REQUIREMENTS

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

.2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.20 ELECTRICAL LOCKOUT

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

.3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

1.21 OVERLOADING

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.22 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1- 1975 (R2003).

1.23 SCAFFOLDING

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 and B.C. Occupational Health and Safety Regulations.

1.24 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with Provincial Regulations

1.25 POWDER-ACTUATED DEVICES

.1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

1.26 FIRE SAFETY AND HOT WORK

.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.27 FIRE SAFETY REQUIREMENTS

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

.3 Portable gas and diesel fuel tanks are not permitted on most federal work sites. Approval from the DR is required prior to any gas or diesel tank being brought onto the work site.

1.28 FIRE PROTECTION AND ALARM SYSTEM

.1 Fire protection and alarm systems shall not be:
- .1 Obstructed.
- .2 Shut off.
- .3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

.3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.29 UNFORESEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

1.30 POSTED DOCUMENTS

.1 Post legible versions of the following documents on site:
- .1 Site Specific Health and Safety Plan.
- .2 Sequence of work.
- .3 Emergency procedures.
- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- .5 Notice of Project.
- .6 Floor plans or site plans.
- .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
- .8 Workplace Hazardous Materials Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.31 MEETINGS

.1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

1.32CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 74 11 – Cleaning

.3 Section 01 74 19 – Construction/Demolition Waste Management and Disposal

1.2 DEFINITIONS

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

.3 Soil: includes unconsolidated mineral or organic material; fill; and sediment deposited on land.

1.3 FIRES

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

1.4 DISPOSAL OF WASTES

.1 Do not discard or dispose of rubbish and waste materials on site unless approved by the Departmental Representative.

.2 Construction wastes must be stored securely and disposed of properly at an approved off-site location.

.3 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.5 DRAINAGE

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.2 Do not pump water containing deleterious substances into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water from excavations, pits, trenches, stockpiled materials and roadways containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.

.2 Do not dump excavated fill, waste material or debris in waterways.

1.7 POLLUTION CONTROL

.1 Install and maintain temporary erosion and sediment control structures, as required, to ensure that deleterious substances do not enter waterways, sewers and stormwater systems.

.2 Protect the roadways from tracking mud, soil and debris throughout the work. Clean the roads as required to maintain a clean worksite.

.3 Control emissions from equipment and plant to local authorities' emission requirements.

.4 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.

.5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

1.8 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

.1 Spills can happen at any time during construction, and there are specific times when the risk is higher such as during the use of paints, corrosive protective coatings, wood preservatives and while working with concrete. Sawdust and wood shavings may enter the marine environment from cutting and drilling during repairs. Potential spills of deleterious substances could result in contamination of the local marine environment, which is a potential violation under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act.

.2 Measures to be implemented to prevent, control, or mitigate spills or release of deleterious substances:

.1 Emergency response procedure for spills of deleterious substances must be in place. In the event of a spill, the Contractor shall immediately implement the appropriate protocols. In the event of a Level I spill (easily contained and cleaned) the contractor will provide spill response and notify the Departmental Representative that a spill has occurred. In the event that there is a Level II spill (spill that cannot be easily contained or cleaned up), the Contractor shall call 911.

.2 Response equipment is to be on site at all times (i.e. spill kits) and workers trained in their location and use. The resources on hand must be sufficient to respond effectively and expediently to any spill that could occur onsite.

.3 All construction equipment brought onto the site will be clean and properly maintained.

.4 Equipment fuelling or lubricating shall occur in a designated area >30m from the marine environment with proper controls to prevent the release of deleterious substances and shall be conducted away from any surface water drains or collection points.

.5 Any equipment remaining on site overnight shall have appropriately placed drip pans.

.6 The Contractor shall take due care to ensure no deleterious materials including sediment-laden runoff leave the worksite, or enter any surface water or storm

water or sanitary sewer at or near the worksite.

.7 Concrete wash water from cast-in-place concrete works (within the first 72hrs) shall not enter any surface water or storm water or sanitary sewer at or near the worksite. Concrete pouring should not be performed if significant precipitation events are expected within 72 hours.

.8 The Contractor shall ensure that no sawdust or shavings enter the marine environment. In the event that sawdust and shavings enter the marine environment, they shall be collected promptly and disposed of appropriately.

.9 The rinse, cleaning water or solvents for glues, paints, wood preservatives and other potentially harmful or toxic substances shall be controlled so as to prevent leakage, loss of discharge into the storm drain system or into the marine environment.

.10 Prevent discharges containing asphalt, grout, concrete or other waste materials from reaching storm drains or the marine environment. This includes, but is not limited to:

.1 Minimizing the washing of sand or gravel from new asphalt, debris from drilling or cutting or other materials into storm drains and the marine environment by sweeping.

.2 Application of fog seals, tack coats or other coatings, if required, during periods when rainfall is unlikely to occur during application.

.3 Cleaning equipment off site.

.4 Protection of drainage structures with filter fences if required.

1.9 HAZARDOUS MATERIALS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.2 Store hazardous or toxic substances in a designated area.

.3 Manage transport and dispose of hazardous materials in an approved legal manner in accordance with hazardous waste regulations.

.4 Provide the Departmental Representative with waste manifest for disposal of hazardous materials.

1.10 SOIL MANAGEMENT

.1 All soil to be removed from the site must be characterized through representative sampling and analysis prior to removal and disposal. All analytical results will be reviewed by the Departmental representative prior to removal of any material from the site. When applicable, soil shall be disposed in permitted facilities in accordance with applicable legislation. All stockpiled soils must be covered at all times.

.2 The Contractor shall arrange for testing of the soil.

.3 Testing and sampling must be done by a independent testing agency accredited according to the Standards Council of Canada, the Canadian Association of Laboratory Accreditation Inc. (ISO/IEC 17025), and British Columbia Ministry of Environment.

.4 Sampling protocol shall be implemented on anticipated volumes as per BC guidelines.

.5 All samples are to be tested at a minimum for Metals, PAH and Hydrocarbons.

.6 The contractor shall ensure all samples are analyzed in accordance with the British Columbia Environmental Laboratory Manual, 2009 Edition prepared by the BC Ministry of Environment.

.7 Test results are to be compared to the BC Contaminated Sites Regulations (CSR).

.8 Contractor is to submit to the Departmental representative a professional report, for review, with laboratory results, analysis and recommendations for disposal.

.9 The Departmental Representative will review all sampling results and will approve the disposal option based on the level of contamination found.

.10 Contaminated soil removed from the site shall be transported and disposed in accordance with all applicable legislation.

.11 All stockpiled materials shall be:

.1 placed on an impermeable surface.

.2 covered with 6-mil poly during precipitation events.

.3 covered with 6 mil poly at the end of each work day,

.4 covered with 6 mil poly when not in use.

.12 The Contractor shall minimize cross-contamination and mixing of individual stockpiles. Individual stockpiles are to be no larger than $50m^3$ in size.

.13 Contractor shall provide suitable equipment at the stockpile site to pile soil into individual stockpiles and for site maintenance.

.14 All stockpiled areas shall be reinstated to original condition or better.

1.11 IMPORT OF FILL MATERIAL

.1 FILL CHARACTERIZATION AND DOCUMENTATION

.1 All imported fill material, regardless of type, shall be tested for the level of contamination prior to arrival on-site.

.2 Environmental characterization of fill material must be conducted in accordance with the British Columbia, Ministry of Environment, Technical Guidance Document #1 – Site Characterization and Confirmation Testing.

.3 Only fill material passing the CCME Residential/Parkland (RL/PL) Land Usage Soil Quality Guidelines will be acceptable for use on Crown land.

.4 The contractor shall submit documented proof to the Departmental Representative that all imported material for this project meets CCME Residential/Parkland (RL/PL) Land Usage Soil Quality Guidelines prior to fill being brought to site.

.5 Documented proof shall be in the form of a signed cover letter and signed test analysis results, from an independent testing firm accredited according to the Standards Council of Canada, the Canadian Association of Laboratory Accreditation Inc. (ISO/IEC 17025), and British Columbia Ministry of Environment.

.6 The cover letter shall:

.1 clearly state that all imported material meets the stated guidelines,

.2 include the name and location of all material sources,

.3 identify the nature of current and historic activities conducted at the source.

.7 The test analysis reports shall:

.1 clearly show the test results for each type of material tested and compared against the CCME Residential/Parkland (RL/PL) Land Usage Soil Quality Guidelines, in an easily-read tabular format.

.2 Include tests results conducted within 3 months of the date of submittal.

.3 include the name and location of all material sources.

.8 All material brought to the site that does not meet the CCME RL/PL Guidelines will be removed from the property immediately at the contractors cost.

1.12 SITE RESTORATION

.1 Disturbed areas shall be seeded at the end of the project to prevent erosion and to stabilize the soil.

1.13 NOTIFICATION

.1 The 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, Erosion and Sediment Control Plan or Soil Management Plan.

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

.3 The Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 **General**

1.1 **REFERENCES AND CODES**

.1 CSA C22.1 Canadian Electrical Code Part1, 2015 edition.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

.3 WorkSafe BC/WCB Regulations, Canada Labour Code Part II, Canada Occupational Safety and Health Regulations.

Part 2 **Products**

2.1 **NOT USED**

Part 3 **Execution**

3.1 **NOT USED**

END OF SECTION

Part 1 General

1.1 INSPECTION

.1 Be responsible for quality control during execution of Work.

.2 Allow the 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.

.3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Departmental Representative's instructions, or law of Place of Work.

.4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.5 The 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, Canada will pay cost of examination and replacement.

1.2 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.

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

1.4 REPORTS

.1 Submit 3 copies of inspection and test reports to the Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

Part 2 **Products**

2.1 **NOT USED**

Part 3 **Execution**

3.1 **NOT USED**

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 DE-WATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

.2 Conform to sediment and erosion control requirements described in Section 01 35 43 - Environmental Procedures and 01 52 00 - Construction Facilities.

1.3 WATER SUPPLY

.1 Potable water is available for construction use at no cost. Departmental Representative will determine delivery points.

.2 Exercise conservation whenever using water supply. Do not leave water running unattended.

.3 Provide all equipment and temporary hoses to bring these services to work, at no additional cost to Contract.

1.4 TEMPORARY POWER AND LIGHT

.1 Electric power is available for construction purposes at no cost at limited locations.

.2 Departmental Representative will determine delivery points and quantitative limits. Departmental Representative's written permission is required before any connection is made. Connect to existing power supply in accordance with Canadian Electrical Code.

.3 Provide and maintain temporary lighting throughout project, if required to work after dark.

.4 Provide all equipment and temporary lines to bring these services to work, at no additional cost to Contract.

.5 Supply of temporary services by Departmental Representative is subject to Departmental Representative's requirements and may be discontinued at any time without notice, without acceptance of any liability for damage or delay caused by such withdrawal of temporary services.

.6 Exercise conservation whenever using temporary electrical power supply.

1.5 TEMPORARY COMMUNICATION

.1 Provide, maintain and pay for temporary telephone and fax communications necessary for own use and for communicating with Departmental Representative during Work. Advise Departmental Representative of telephone and fax numbers immediately upon installation

.2 Provide, maintain and pay for temporary e-mail and data communications necessary for own use and for communicating with Departmental Representative during Work. Advise Departmental Representative of contact information immediately upon installation.

1.7 FIRE PROTECTION

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

.2 Conform to site fire plan where in effect.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
.1 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Workplace.

1.3 SCAFFOLDING

.1 Provide and maintain scaffolding, ladders and platforms required for performance of Work.

1.4 HOISTING

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

.2 Hoists to be operated by certified operators.

1.5 SITE STORAGE/LOADING

.1 Confine work and operations of employees to areas defined by Contract Documents unless directed otherwise in writing by Departmental Representative. Do not unreasonably encumber premises with products.

1.6 CONSTRUCTION PARKING

.1 Arrange parking in areas directed by Departmental Representative.

.2 Existing roads may be used for access to project site. Maintain construction parking area clean and free of construction-related debris, spillage and soiling.

.3 Make good damage resulting from Contractor's use of parking areas and roads at no cost to Contract.

1.7 SECURITY

.1 Refer to Section 01 11 55 - General Instructions for conditions governing site security and access.

1.8 SITE OFFICE

.1 Provide and maintain site office at own expense during performance of Work. Maintain in clean condition. Equip with lighting, heat and adequate fresh air ventilation.

.2 Arrange and equip office to allow for proper filing and examination of Contract Documents and regulatory documents.

.3 Equip office with adequate first aid facilities to requirements of governing authorities.

.4 Locate within work area.

1.9 EQUIPMENT, TOOL, MATERIALS STORAGE

.1 Provide and maintain, in a clean and orderly condition, locking storage for tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds.

.3 Locate within work area in a manner to cause least interference with work activities.

1.10 SANITARY FACILITIES

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

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

.3 Locate within work area in a manner to cause least interference with work activities.

1.11 CONSTRUCTION SIGNAGE

.1 Provide project identification sign as directed by the Departmental Representative after award of contract.

1.12 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water run-off and airborne dust to adjacent properties and walkways.

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

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 HOARDING

.1 Provide plywood hoarding around work area to enclose activities and material storage. Alter and modify as required to accommodate Work.

.2 Provide barriers around trees and plants. Protect from damage by equipment and construction procedures.

1.3 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished openings.

.2 Design enclosures to withstand wind pressure and snow loading.

1.4 FIRE ROUTES

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

1.5 PROTECTION OF PROPERTY

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

.2 Be responsible for damage incurred at no additional cost to Contract.

1.6 PROTECTION OF BUILDING FINISHES

.1 Provide protection for existing finished building surfaces and equipment during performance of Work.

.2 Provide necessary screens, covers, pads and hoardings.

.3 Be responsible for damage incurred due to lack of or improper protection, at no additional cost to Contract.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

.1 Use NEW products/material and equipment unless otherwise specified. Term "products" is referred to throughout specifications.

.2 Use products of one (1) manufacturer for material and equipment of same type or classification unless otherwise specified.

.3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer instructions. Departmental Representative will designate which document is to be followed.

.5 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur.
- .1 Prevent electrolytic action between dissimilar metals.
- .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.

.6 Fastenings which cause spalling or cracking are not acceptable.

.7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.8 Use heavy hexagon heads, semi-finished unless otherwise specified.

.9 Bolts may not project more than 1 diameter beyond nuts.

.10 Types of washers as follows:
- .1 Plain type washers: use on equipment and sheet metal.
- .2 Soft gasket lock type washers: use where vibrations occur.
- .3 Resilient washers: use with stainless steel items and fasteners.
- .4 FRP fibre reinforced plastic washers: use with FRP items and fabrications.

.11 Deliver, store and maintain packaged material and equipment with manufacturer seals and labels intact.

.12 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.

.13 Store products in accordance with supplier instructions.

.14 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction:
- .1 Use primer or enamel to match original.
- .2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

.1 Products, materials and equipment (referred to as products) incorporated into work to be

new, not damaged or defective and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

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

.3 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet requirements of specifications. Produce documents when requested by Departmental Representative.

.4 Should any dispute arise as to quality or fitness of products, the decision rests strictly with Departmental Representative based upon requirements of Contract documents.

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

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY OF PRODUCTS

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of work.

.3 In event of failure to notify Departmental Representative at start of work and should it subsequently appear that work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in either Contract price or Contract time.

1.4 MANUFACTURER INSTRUCTIONS

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

.2 Notify Departmental Representative in writing of conflicts between specifications and manufacturer instructions so that Departmental Representative may establish course of action.

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

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

.1 Products are specified by "Prescriptive" specifications: select any product meeting or exceeding specifications.

.2 Products specified under "Acceptable Products" (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding Prescriptive specifications and indicated Products.

.3 Products specified by performance and referenced standard: select any product meeting or exceeding referenced standard.

.4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers".

.5 When products are specified by referenced standard or by Performance specifications, upon request of Departmental Representative obtain from manufacturer and independent laboratory report showing that product meets or exceeds specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

.1 No substitutions are permitted without prior written approval of Departmental Representative.

.2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and proposed substitution.

.3 Proposals will be considered by Departmental Representative if:
- .1 products selected by tenderer from those specified are not available;
- .2 delivery date of products selected from those specified would unduly delay completion of Contract, or
- .3 alternative product to that specified, which is brought to attention of Departmental Representative is considered by Departmental Representative as equivalent to product specified and will result in a credit to Contract amount.

.4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution.

.5 Amounts of all credits arising from approval of substitutions will be determined by Departmental Representative and Contract price will be reduced accordingly.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submit written request in advance of cutting or alteration which affects any of following.

- .1 Structural integrity of any part of Project.
- .2 Efficiency, maintenance or safety of any operational element.
- .3 Visual qualities of sight-exposed elements.
- .4 Interior and exterior building finishes.

.2 The structures are designated heritage in status. Due care must be taken to not alter or damage any portions of the buildings deemed heritage.

1.2 INCLUDE IN REQUEST:

.1 Identification of Project.

.2 Location and description of affected Work.

.3 Statement on necessity for cutting or alteration.

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

.5 Alternatives to cutting and patching.

.6 Effect on work of Other Contractor.

.7 Written permission of affected Other Contractor.

.8 Date and time work will be executed.

1.3 MATERIALS

.1 Required for original installation.

1.4 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

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

.3 Beginning of cutting or patching means acceptance of existing conditions.

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

.5 Cover adjacent surfaces and finishes with clean and dry drop sheets, kraft paper, cardboard or other suitable coverings during minor demolition.

1.5 EXECUTION

.1 Execute cutting, fitting and patching required to perform work. Perform minor demolition required for alterations with care not to damage adjacent construction, fittings, fixtures, surfaces and finishes scheduled to remain.

.2 Obtain Departmental Representative's approval before cutting, boring or sleeving load-bearing members

.3 Fit several parts together, to integrate with other work.

.4 Uncover work to install ill-timed work, at no cost to Contract.

.5 Remove and replace defective and non-conforming work, at no cost to Contract.

.6 Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing. Make cuts with clean, true, smooth edges.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

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

.9 Include cost of making good all surfaces, substrates and work disturbed by removal of existing work and by installation of new work.

1.6 MATCHING TO EXISTING WORK

.1 Make new work in existing areas and all alteration/renovation work match in every respect similar items in existing areas.

.2 Use new materials to match existing items. Where perfect matches cannot be made as to quality, texture, colour and pattern remove existing materials and replace with new materials of comparable quality selected by the Departmental Representative, to extent directed by the Departmental Representative.

.3 Execute Work carefully wherever existing work is being re-used. Make repairs to such reused items after re-installation to properly restore them. Where proper restoration is impractical, such items will be rejected and replaced to the Departmental Representative's approval.

.4 After removal of reusable items, carefully patch and repair original location.

.5 Wherever existing work is being altered to make way for new work, perform such cutting and patching neatly and make finished installations equal to quality and appearance.

.6 Where new work is a continuation or an extension of existing work take care to blend both together with complete regard to appearance. Obvious joints and visible patches not acceptable.

1.7 SETTING OUT OF WORK

.1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.2 Provide devices needed to lay out and construct work.

.3 Supply such devices as straight edges and templates required to facilitate the Departmental Representative's inspection of work.

.4 Review layouts with the Departmental Representative prior to commencement of work.

1.8 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform the Departmental Representative of impending installation and obtain his approval for actual location.

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

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

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

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by the Departmental Representative. Refer to Section 01 35 43 - Environmental Procedures for additional requirements.

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

.4 Provide on-site containers for collection of waste materials and debris. Locate where directed by the Departmental Representative.

.5 Provide and use clearly marked separate bins for recycling wherever facilities are available. Refer to Section 01 74 19 - Construction/Demolition Waste Management and Disposal for additional requirements.

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

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

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

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

1.2 FINAL CLEANING

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

.2 Remove waste products and debris.

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

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

.5 Remove stains, spots, marks and dirt from decorative work, electrical/mechanical fixtures, furniture fitments; walls, floors and ceilings.

.6 Clean lighting reflectors, lenses and other lighting surfaces.

.7 Vacuum clean and dust room interiors.

.8 Sweep and power wash pavement around building and all pavement parking/storage

areas used by Contractor to remove all traces of construction spillage, stains and residue. Do not blast dirty water onto adjacent buildings and site features.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Refer to every technical section for waste management and disposal requirements.

1.2 DEFINITIONS

.1 Waste Reduction Workplan: written report which addresses opportunities for reduction, re-use or recycling of materials.

.2 Materials Source Separation Program: consists of series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at point of generation.

1.3 MATERIALS SOURCE SEPARATION

.1 Before project start-up, prepare Materials Source Separation Program. Provide separate containers for re-usable and/or recyclable materials of following:
- .1 Construction waste: including but not limited to following types.
  - .1 Uncontaminated packaging (wood, metal banding, cardboard, paper, plastic wrappings, polystyrene).
  - .2 Wood pallets (recycle or return to shipper).
  - .3 Metals (pipe, conduit, ducting, wiring, miscellaneous cuttings)
  - .4 Wood (uncontaminated).
  - .5 Paint, solvent, oil.
  - .6 Other materials as indicated in technical sections.
- .2 Administration/worker waste (uncontaminated): including but not limited to following types.
  - .1 Paper, cardboard.
  - .2 Plastic containers and lids marked types 1 through 6.
  - .3 Glass and aluminum drink containers (recycle or return to vendor).

.2 Implement Materials Source Separation Program for waste generated on project in compliance with approved methods and as approved by Departmental Representative.

.3 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.4 Locate separated materials in areas which minimize material damage.

1.4 DIVERSION OF MATERIALS

.1 Create list of materials to be separated from general waste stream and stockpiled in separate containers, to approval of Departmental Representative and consistent with applicable fire regulations.
- .1 Mark containers.
- .2 Provide instruction on disposal practices.

1.5 STORAGE, HANDLING AND APPLICATION

.1 Do work in compliance with Waste Reduction Workplan.

.2 Handle waste materials not re-used, salvaged, or recycled in accordance with appropriate regulations and codes.

.3 Materials in separated condition: collect, handle, store on site and transport off-site to approved and authorized recycling facility.

.4 Materials must be immediately separated into required categories for re-use or recycling.

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

.6 On-site sale of salvaged/recyclable material is not permitted.

.7 On-site burning of material is not permitted.

.8 Provide Departmental Representative with receipts indicating quantity of material delivered to landfill.

.9 Provide Departmental Representative with receipts indicating quantity and type of materials sent for recycling.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

1.0 General

1.1 SECTION INCLUDES

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

1.3 REVIEW AND DECLARATION

.1 Contractor's review: Contractor and all Subcontractors shall conduct a thorough review of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

- .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's review and that corrections have been made.
- .2 Request Departmental Representative's review.
- .3 Departmental Representative's Review: Departmental Representative and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .4 Completion: submit written certificate that following have been performed:
  - .1 Work has been completed and reviewed for compliance with Contract Documents.
  - .2 Defects have been corrected and deficiencies have been completed.
  - .3 Equipment and systems have been tested, adjusted, and balanced and are fully operational.
  - .4 Certificates required by authorities having jurisdiction.
  - .5 Commissioning of all systems: Final commissioning reports have been submitted to the Departmental Representative.
  - .6 Operation of systems have been demonstrated to Owner's personnel.
  - .7 Work is complete and ready for Final Review.

.2 Submit required forms as described in General Conditions and Standard Acquisition Contract Clause (SACC) manual.

Part 1 Products

1.1 NOT USED

Part 2 Execution

2.1 NOT USED

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Closeout Procedures: Section 01 77 00

1.2 SUBMISSION

.1 Provide red-line as-built mark-ups.

.2 Copies of shop drawings.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 PRICE AND PAYMENT PROCEDURES

.1 Not Used.

1.03 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 260/C 260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C 494/C 494M-10a, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- .5 ASTM D 412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .6 ASTM D 624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .7 ASTM D 1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- .8 ASTM D 1752-04a(2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Damp proofing and Waterproofing and for Roof Coatings.
- .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA International
- .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.
- .3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.04 ABBREVIATIONS AND ACRONYMS

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

blended) and Portland-limestone cement.
- .1 Type GU, GUb and GUL - General use cement.
- .2 Type MS and MSb - Moderate sulphate-resistant cement.
- .3 Type MH, MHb and MHL - Moderate heat of hydration cement.
- .4 Type HE, HEb and HEL - High early-strength cement.
- .5 Type LH, LHb and LHL - Low heat of hydration cement.
- .6 Type HS and HSb - High sulphate-resistant cement.

.2 Fly ash:
- .1 Type F - with CaO content less than 15%.
- .2 Type CI - with CaO content ranging from 15 to 20%.
- .3 Type CH - with CaO greater than 20%.

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

1.05 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: convene pre-installation meeting one week prior to beginning work.
- .1 Ensure Departmental Representative and specialty contractor - finishing, forming attend.
  - .1 Verify project requirements.

1.06 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used

1.07 QUALITY ASSURANCE

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

.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 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
- .1 Falsework erection.
- .2 Hot weather concrete.
- .3 Cold weather concrete.
- .4 Curing.
- .5 Finishes.
- .6 Formwork removal.
- .7 Joints.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of

concrete as established in PART 2 - PRODUCTS.

1.08 DELIVERY, STORAGE AND HANDLING

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

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

.3 Packaging Waste Management: remove for reuse and return by manufacturer of in accordance with Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.01 DESIGN CRITERIA

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

2.02 PERFORMANCE CRITERIA

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

2.03 MATERIALS

.1 Portland Cement: to CSA A3001
- .1 Reduction in cement from Base Mix to Actual Supplementary Cementing Materials (SCMs) Mix, as percentage.

.2 Blended hydraulic cement: to CSA A3001.

.3 Portland-limestone cement: to CSA A23.1.

.4 Supplementary cementing materials: to CSA A3001.

.5 Water: to CSA A23.1.

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

.7 Admixtures:

.1 Air entraining admixture: to ASTM C 260.
.2 Chemical admixture: to ASTM C 494 and ASTM C 1017. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.8 Shrinkage compensating grout: premixed compound consisting of metallic, non-metallic, aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
.1 Compressive strength: 32 MPa at 28 days.

.9 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 35 MPa at 28 days.

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

.11 Curing compound: to CSA A23.1/A23.2 and ASTM C 309.

.12 Mechanical waterstops: ribbed/labyrinth extruded PVC Arctic Grade of sizes indicated with shop welded/prewelded corner and intersecting pieces:
.1 Tensile strength: to ASTM D 412.
.2 Elongation: to ASTM D 412.
.3 Tear resistance: to ASTM D 624.

.13 Premoulded joint fillers:
.1 Bituminous impregnated fibre board: to ASTM D 1751.
.2 Sponge rubber: to ASTM D 1752, Type I, firm grade.
.3 Standard cork: to ASTM D 1752.

.14 Weep hole tubes: galvanized steel/plastic.

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

.16 Dampproof membrane:
.1 Kraft/polyethylene membrane:
.1 Plain: polyethylene film bonded to asphalt treated creped kraft.
.2 Reinforced: two polyethylene films bonded each side of asphalt treated creped kraft paper, reinforced with 13 x 13 mm fibreglass scrim.
.3 Membrane adhesive: as recommended by membrane manufacturer.

.17 Damp proofing:
.1 Emulsified asphalt, mineral colloid type, unfilled: to CAN/CGSB-37.2.

.18 Polyethylene film: to CAN/CGSB-51.34.

2.04 MIXES

.1 Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
- .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
- .2 Provide concrete mix to meet following plastic state requirements:
  - .1 Workability: free of surface blemishes, loss of mortar, colour variations, and segregation.
- .3 Provide concrete mix to meet following hard state requirements:
  - .1 Durability and class of exposure: C-XL, C-1, A-1, C-2, A-2, C-3, A-3, C-4, A-4, F-1, F-2, N.
  - .2 Compressive strength at 28 age: 35 Mpa minimum.
- .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

3 EXECUTION

3.01 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.
- .1 Provide 24 hours minimum notice prior to placing of concrete.

.2 During concreting operations:
- .1 Development of cold joints not allowed.
- .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.3 Pumping of concrete will not be permitted.

.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 for concrete finishes.

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

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

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

3.02 INSTALLATION/ APPLICATION

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

.2 Sleeves and inserts:
- .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.
- .2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
- .3 Sleeves and openings greater than 100 x 100 mm not indicated must be reviewed by Departmental Representative.
- .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
- .5 Confirm locations and sizes of sleeves and openings shown on drawings.
- .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts:
- .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
- .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.
  - .1 Formed holes: 100 mm minimum diameter.
  - .2 Drilled holes: to manufacturers' recommendations.
- .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
- .4 Set bolts and fill holes with shrinkage compensating grout/epoxy grout.
- .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.4 Drainage holes and weep holes:
- .1 Install weep hole tubes and drains as indicated.

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

.6 Finishing and curing:
- .1 Finish concrete to CSA A23.1/A23.2.
- .2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface

is not damaged.

.3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

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

.5 Provide screed/float/swirl-trowelled finish unless otherwise indicated.

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

.7 Toppings:

.1 Topping mixture to meet minimum requirements as follows: Monolithic/Bonded overlay to meet existing.

.2 Make allowance for monolithic and bonded overlay topping thickness when pouring base course.

.3 Apply cement/sand grout/latex bonding agent modified cement/sand grout/epoxy bonding agent to base course to CSA A23.1/A23.2.

.4 Place monolithic/bonded topping to CSA A23.1/A23.2 and topping manufacturer's recommendations.

.5 Ensure that joints in topping are of same material as those in base course. Also ensure that their locations precisely match those in base course. Provide reinforcing mesh as indicated.

.8 Joint fillers:

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

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

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

.4 Install joint filler.

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

3.03 SURFACE TOLERANCE

.1 Not Used.

3.04 FIELD QUALITY CONTROL

.1 Site tests: conduct tests and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by

testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.

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

.5 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

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

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

3.05 CLEANING

.1 Clean in accordance as per requirements by the Departmental Representative.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with requirements by the Departmental Representative.

.1 Materials and Resources Credit MRc2.1 Construction Waste Management: Divert 50% From Landfill and MRc2.2 Construction Waste Management: Divert 75% from Landfill: prepare Construction Waste Management plan.

.2 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.

.3 Provide appropriate area on job site where concrete trucks and be safely washed.

.4 Divert unused admixtures and additive materials from landfill to official hazardous material collections site as approved by Departmental Representative.

.5 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.

.6 Prevent admixtures and additive materials from entering drinking water supplies or streams.

.7 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.

.3 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies the materials and installation for wire and box connectors, rated to 1000V.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2No.18 latest edition, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2No.65 latest edition, Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2, latest edition, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2No.65, with current carrying parts of copper alloy sized to fit copper conductors as required.

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

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for stranded copper conductors.

.2 Clamp for stranded copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

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

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies copper, conductors rated 0-1000 Volts and the most common electrical insulation and covering materials.

.2 This section does not include fire rated building wire to ULC S139 and CSA C83, marine, hazardous, mining, instrumentation, communication and fire alarm wiring.

1.2 REFERENCES

.1 CSA C22.2 No .0.3 latest edition, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No. 131 latest edition, Type TECK 90 Cable.

1.3 GENERAL REQUIREMENTS

.1 Typically use insulated 98% conductivity copper conductor wiring enclosed in EMT (steel) conduit for the general wiring systems unless otherwise indicated.

.2 Aluminium conductors only permitted where indicated on drawings and then typically only for feeder conductors larger than 100 A. All conductor sizes indicated on drawings are based on copper conductors unless otherwise noted.

.3 Teck cable may only be used where specifically indicated on the drawings or in the specifications. Where permitted, Teck wiring up to 750 system volts to be PVC jacketed armoured cable, multi-copper conductor type Teck90 1000 volt having a PVC jacket with FT-4 flame spread rating.

.4 Flexible AC90 armoured cabling (BX) shall not be used for the general wiring system other than final drops to recessed light fixtures in concealed locations.

.5 Cabling indicated to be 2-Hour Fire-Rated shall be compliant to CAN/ULC-S139 and CSA 38-95 (Draka Lifeline, Raychem RHW, or Shawflex). Cabling shall be low smoke halogen free. Conduit to be sized and installed as per manufacturers' requirements for these specialized cables and assemblies regardless of the size indicated on drawings.

.6 Non-metallic sheathed wiring is not to be used on this project.

Part 2 Products

2.1 WIRE AND CABLE GENERAL

.1 Conductors: Minimum size #12 AWG.

.2 Insulation to be 600 volt RW90XLPE (X link) for the general building wiring in conduit.

.3 Use RWU90XLPE for underground installations.

.4 Conductors to be colour-coded.

BRANCH CIRCUIT CONDUCTORS:	EMITTER POWER CONDUCTORS:
Neutral: White	Neutral: Blue
Line: Black	Line: Brown
Ground: Green	Ground: Green

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section includes materials and installation for connectors and terminations.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Copper connectors as required sized for conductors.

.2 Joint boxes in accordance with Section 26 05 33 - Raceway and Boxes for Electrical Systems.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies the materials and installation for grounding electrical systems rated 750V or less.

1.2 REFERENCES

.1 ANSI/IEEE 837- 2004 – Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 CSA C22.2 No. 41 - 2007 – Grounding and Bonding Equipment.

Part 2 Products

2.1 EQUIPMENT

.1 Insulated grounding conductors: green, type.

.2 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

- .1 Grounding and bonding bushings.
- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Thermit welded type conductor connectors.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install connectors in accordance with manufacturer's instructions.

.2 Protect exposed grounding conductors from mechanical injury.

.3 Make buried connections, and connections to conductive water main, electrodes, using permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

.5 Soldered joints not permitted.

.6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

3.2 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in the systems.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for splitters, junction boxes, pull boxes and cabinets.

1.2 PRODUCT DATA

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

.2 Product Data: submit manufacturer's product data sheets indicating dimensions, materials, and finishes, including classifications and certifications.

.3 Shop Drawings: submit shop drawings for custom manufactured items showing materials, finish, dimensions, accessories, layout, and installation details.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 All junction boxes should be at least 150 X 150 X 100 mm. Replace any boxes that do not meet this requirement. The face of the junction boxes shall be parallel to edge of lane.

Part 3 Execution

3.1 JUNCTION BOXES INSTALLATION

.1 Install junction installation to be as detailed on the drawing.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies empty telecommunications raceway systems with RGS and RPVC conduit system.

1.2 SYSTEM DESCRIPTION

.1 Empty telecommunications raceways system consists of outlet boxes, cover plates, cabinets, conduits, and pull boxes.

Part 2 Products

2.1 MATERIAL

.1 Conduits: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Underground cable ducts: in accordance with Section 33 65 76 - Direct Buried Underground Cable Ducts.

.3 Junction boxes and cabinets: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.

.4 Fish wire: polypropylene type.

Part 3 Execution

3.1 INSTALLATION

.1 Install empty raceway system, including distribution system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, and conduit.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 REFERENCE STANDARDS

.1 ASTM International
  .1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used.

1.04 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 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

2 PRODUCTS

2.01 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.
  .1 Greatest dimension to exceed 5 times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
  .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
  .2 Reclaimed asphalt pavement.
  .3 Reclaimed concrete material.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.
.2 Gravel and crushed gravel composed of naturally formed particles of stone.
.3 Light weight aggregate, including slag and expanded shale.
.4 Reclaimed asphalt pavement.
.5 Reclaimed concrete material.

2.02 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 2 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative 2 weeks minimum 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.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for topsoil stripping.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with topsoil stripping only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 PREPARATION

.1 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 approved by authority having jurisdiction.
  .2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
  .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
  .4 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.
  .5 Trim off and dress slopes of waste material piles and leave site in neat

condition.

.6 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.

.2 Processing:

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.

.1 Use methods and equipment approved in writing by Departmental Representative.

.3 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

.4 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.

.1 Use only equipment approved in writing by Departmental Representative.

.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 hours of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Maximum 1.5 m for coarse aggregate and base course materials.

.2 Maximum 1.5 m for fine aggregate and sub-base materials.

.3 Maximum 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 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.03 CLEANING

.1 Progress Cleaning:
  .1 Leave Work area clean at end of each day.

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

.3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

.5 Waste Management: separate waste materials for reuse and recycling.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.6 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

.7 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 MEASUREMENT PROCEDURES

.1 Not Used.

1.03 REFERENCE STANDARDS

.1 ASTM International
  .1 ASTM D698-07e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3) [600 kN-m/m^3]

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 EXAMINATION

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

3.02 SCARIFYING AND RESHAPING

.1 Scarify subgrade to full width as directed by Departmental Representative.

.2 Where deficiency of material exists, add and blend additional subgrade material as directed by Departmental Representative.

.3 Waste excess material/Re-use excess material in areas of material deficiency as directed by Departmental Representative.

3.03 COMPACTING

.1 Compact to minimum/maximum dry density to ASTM D 698.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted subgrade surface.

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

.4 If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected to ASTM D 698.

3.04 SITE TOLERANCES

.1 Reshaped compacted surface to be within plus or minus 10 mm of elevation as indicated.

3.05 CLEANING

.1 Progress Cleaning:
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment as per direction of Departmental Representative.

.3 Waste Management: separate waste materials for reuse and recycling as per direction of Departmental Representative.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

.1 Protect and maintain reshaped surface in condition conforming to this Section until succeeding material is applied or until after receipt of written acceptance from Departmental Representative.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 MEASUREMENT PROCEDURES

.1 Excavated materials will be measured in cubic metres in their original location.
- .1 Common excavation quantities measured will be actual volume removed within following limits:
  - .1 Width for trench excavation as indicated.
  - .2 Width for excavation for structures as indicated.
  - .3 Depth from ground elevation and surface of pavement/surface of sidewalk immediately prior to excavation, to elevation as directed by Departmental Representative.

.2 Backfilling to authorized excavation limits will be measured in cubic metres compacted in place for each type of material specified.

.3 Placing and spreading of topsoil will be measured for payment in cubic metres calculated from cross sections taken in area of excavation from original location.
- .1 If double handling of topsoil is directed by Departmental Representative, stockpiling and later placing, then quantities will be measured twice; on excavation from original location and on excavation from stockpile.

1.03 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 117-04, Standard Test Method for Material 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 422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).
- .5 ASTM D 1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).
- .6 ASTM D 4318-05, 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-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
- .2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water
- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.04 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
- .1 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 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 D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: 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.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality Control:
- .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
- .2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
- .3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
- .4 Submit to Departmental Representative written notice when bottom of excavation is reached.
- .5 Submit to Departmental Representative testing, inspection results and report as described in PART 3 of this Section.

.4 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, and location plan of relocated and abandoned services, as required.

1.06 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Keep design and supporting data on site.

.3 Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.

.4 Health and Safety Requirements:
- .1 Do construction occupational health and safety in accordance with Provincial Health and Safety Requirements.

1.07 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Divert excess aggregate materials from landfill to local facility for reuse as directed

by Departmental Representative.

1.08 EXISTING CONDITIONS

.1 Examine soil report.

.2 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 applicable Departmental Representative establish location and state of use of buried utilities and structures. Departmental Representative to clearly mark such locations to prevent disturbance during Work.
- .6 Confirm locations of buried utilities by careful test excavations and soil hydrovac methods.
- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to be paid by Departmental Representative.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing buildings and surface features:

- .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, 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
- .3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

2 PRODUCTS

2.01 MATERIALS

.1 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:

- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing	
	Type 1	Type 2
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

.2 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.

.3 Shearmat: honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.

3 EXECUTION

3.01 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 specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.02 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.

3.03 PREPARATION/ PROTECTION

.1 Protect existing features as directed by the Departmental Representative 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.

3.04 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of brush, weeds, and grasses, and removed from site.

.2 Strip topsoil to depths as directed by Departmental Representative.
.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by Departmental Representative.
.1 Stockpile height not to exceed 2 m and should be protected from erosion.

.4 Dispose of unused topsoil as directed by Departmental Representative.

3.05 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.

3.06 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Provincial Health and Safety Requirements for the Province British Columbia.
.1 Where conditions are unstable, Departmental Representative to verify and advise methods.

.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.3 Construct temporary Works to depths, heights and locations as directed by Departmental Representative and approved by Departmental Representative.

.4 During backfill operation:
- .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
- .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:
- .1 Remove cofferdams, shoring and bracing.
- .2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.07 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for Departmental Representative review and approval 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 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 - Environmental Procedures to approved collection or runoff areas and in a manner not detrimental to public and private property, or portion of Work completed or under construction.

.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.

3.08 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 and directed by Departmental Representative.

.3 Remove concrete, paving, walks, rubble and other obstructions encountered during excavation as directed by the Departmental Representative.

.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 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 in approved location on 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 other areas with Type 2 fill compacted to not less than 95% of corrected Standard Proctor maximum dry density.

.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.

3.09 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698 and ASTM D 1557.
- .1 Under concrete slabs: provide 150 mm compacted thickness base course of Type 1 fill topped with shearmat filler as indicated to underside of slab. Compact base course to 100%.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:
- .1 Departmental Representative has inspected and approved installations.
- .2 Departmental Representative has inspected and approved of construction below finish grade.
- .3 Inspection, testing, approval, and recording location of underground utilities.
- .4 Removal of concrete formwork.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:
- .1 Place bedding and surround material as specified elsewhere.
- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading.
- .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.

3.12 RESTORATION

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and

correct defects as directed by Departmental Representative.

.2 Replace topsoil 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

1 GENERAL

1.01 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Granular based material: supplied by Contractor.

1.02 RELATED REQUIREMENTS

.1 Not Used.

1.03 MEASUREMENT AND PAYMENT

.1 Measure granular sub-base in cubic metres by truck box measurement of material incorporated into Work and accepted by Departmental Representative.

.2 Measure excavation of sub-base and subgrade materials to correct deficiencies in subgrade discovered during proof rolling as common excavation.
- .1 Measure backfill of subgrade with common materials as common excavation and subgrade.
- .2 Measure backfill of subgrade with sub-base material and replacement of sub-base material under this Section.

.3 Measure hauling granular sub-base material in cubic metres, computed by taking product of number of cubic metres of material placed multiplied by haul distance in kilometres.
- .1 Measure haul distance from source of material to centre of volume of material after placing, measured along shortest route determined by Departmental Representative as being feasible and satisfactory.

.4 Measure water in units of 1000L for water authorized by Departmental Representative and applied.

.5 Measure compaction of granular sub-base in hours for particular compaction units employed including operator, fuel and maintenance.

1.04 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D 422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
- .5 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction

Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.6 ASTM D 1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).

.7 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.8 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 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 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used.

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Replace defective or damaged materials with new.

.3 Develop Construction Waste Management Plan related to Work of this Section.

2 PRODUCTS

2.01 MATERIALS

.1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

3 Table

Sieve Designation	% Passing			
100 mm	-	-	-	-
75 mm	100	100	100	-
50 mm	-	-	-	100

37.5 mm	-	-	-	-
25 mm	55-100		-	60-100
19 mm	-	-	-	-
12.5 mm	-	-	-	38-70
9.5 mm	-	-	-	-
4.75 mm	25-100	25-85	-	22-55
.00 mm	15-80	-	-	13-42
0.425 mm	4-50	5-30	0-30	5-28
0.180 mm	-	-	-	-
.075 mm	0-8	0-10	0-8	2-10

.4 Other properties as follows:
- .1 Liquid Limit: to ASTM D 4318, Maximum 25.
- .2 Plasticity Index: to ASTM D 4318, Maximum 6.
- .3 Los Angeles degradation: to ASTM C 131.
  - .1 Maximum loss by mass: 40%.
- .4 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%.
- .5 Soaked CBR: to ASTM D 1883, Minimum 40 when compacted to 100% of ASTM D 1557.

3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 PLACING

.1 Place granular sub-base after subgrade is inspected and approved by 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 Begin spreading sub-base material on crown line or high side of one-way slope.

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

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

.8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.

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

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

3.04 COMPACTION

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

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

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

.4 Compact to density of not less than 98% corrected maximum dry density in accordance with ASTM D 698 ASTM D 1557.

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

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

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

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

3.05 PROOF ROLLING

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.

.2 Obtain written approval from Departmental Representative to use non standard proof rolling equipment.

.3 Proof roll at level in sub-base as indicated.
- .1 If non standard proof rolling equipment is approved, Departmental Representative will determine level of proof rolling.

.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.5 Where proof rolling reveals areas of defective subgrade:
- .1 Remove sub-base and subgrade material to depth and extent as directed by Departmental Representative.
- .2 Backfill excavated subgrade with common material and compact in accordance with and compact in accordance with this section.
- .3 Replace sub-base material and compact.

.6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.06 CLEANING

.1 Progress Cleaning:
- .1 Leave Work area clean at end of each day.

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

3 Waste Management: separate waste materials for reuse and recycling.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 SITE TOLERANCES

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

uniformly high or low.

3.08 PROTECTION

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

END OF SECTION

1 GENERAL

1.01 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Not Used.

1.02 RELATED REQUIREMENTS

.1 Not Used.

1.03 MEASUREMENT AND PAYMENT

.1 Measure granular base in cubic metres measured in truck box measurement of material incorporated into Work and accepted in writing by Departmental Representative.

.2 Measure excavation of base, sub-base and sub-grade materials to correct deficiencies in sub-grade discovered during proof rolling as common excavation.
- .1 Measure backfill of sub-grade with common materials approved in writing by Departmental Representative, as common excavation and sub-grade compaction.
- .2 Measure backfill of subgrade with sub-base material and replacement of sub-base material to Section 32 11 16.01 - Granular Sub-base.
- .3 Measure subsequent replacement of base materials under this Section.

.3 Measure hauling granular base material in cubic metre-kilometres computed by taking product of number of cubic metre-kilometres of material placed multiplied by haul distance in kilometres.
- .1 Measure haul distance from source of material to centre of volume of material after placing, measured along shortest route determined by Departmental Representative as being feasible and satisfactory.

.4 Measure water in units of 1000 L for water authorized by Departmental Representative and applied.

.5 Measure compaction of granular base in hours for each type of compaction unit employed including operator, fuel and maintenance, as shown on recording devices approved in writing by Departmental Representative.

1.04 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm No. 200 Sieve in Mineral Aggregates by Washing.
- .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and

Coarse Aggregates.

.4 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400ft-lbf/ft³ 600kN-m/m³.

.5 ASTM D 1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000ft-lbf lbf/ft³ 2700kN-m/m³.

.6 ASTM D 1883-07e2, Standard Test Method for CBR California Bearing Ratio of Laboratory Compacted Soils.

.7 ASTM D 4318-10, 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 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used.

1.06 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, 31 05 16 - Aggregate Materials and with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 Stockpile minimum 50% of total aggregate required prior to beginning operation.

.2 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.3 Replace defective or damaged materials with new.

.4 Store cement in weathertight bins or silos that provide protection from dampness and easy access for inspection and identification of each shipment.

.3 Develop Construction Waste Management Plan related to Work of this Section.

.4 Packaging Waste Management: remove for reuse and return by manufacturer as specified in Construction Waste Management Plan.

2 PRODUCTS

2.01 MATERIALS

.1 Granular base: material in accordance with Section 31 05 16 - Aggregate

Materials and following requirements:

.1 Crushed stone or gravel..

.2 Material to level surface depressions to meet gradation 2 limits in accordance with Method #1.

.3 Liquid limit: to ASTM D 4318, maximum 25

.4 Plasticity index: to ASTM D 4318, maximum 6.

.5 Los Angeles degradation: to ASTM C 131. Max. % loss by weight: 45

.6 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C 136.

Passing		Retained on
50 mm	to	25 mm
25 mm	to	19.0 mm
19.0 mm	to	4.75 mm

.7 Soaked CBR: to ASTM D 1883, minimum 80 100, when compacted to 100% of ASTM D 1557.

3 EXECUTION

3.01 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.02 PLACEMENT AND INSTALLATION

.1 Place granular base after sub-base subgrade surface is inspected and approved in writing by Departmental Representative.

.2 Placing:

.1 Construct granular base to depth and grade in areas indicated.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

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

.5 Place material using methods which do not lead to segregation or degradation of aggregate.

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

.7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 Departmental Representative may authorize thicker lift layers if specified compaction can be achieved.

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

.9 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment:

.1 Ensure compaction equipment is capable of obtaining required material densities.

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

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

.4 Compacting:

.1 Compact to density not less than 100% corrected maximum dry density to ASTM D 698 ASTM D 1557.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtain specified density.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.

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

.5 Proof rolling:

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain written approval from Departmental Representative to use non standard proof rolling equipment.

.3 Proof roll at level in granular base as indicated.

.1 If use of non standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.

.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.5 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by Departmental Representative.

.2 Backfill excavated subgrade with common material and compact

sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-Base.

.3 Replace sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-base.

.4 Replace base material and compact in accordance with this Section.

.6 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with Section 32 11 16.01 - Granular Sub-base and this section at no extra cost.

3.03 SITE TOLERANCES

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.04 CLEANING

.1 Progress Cleaning:

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

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

.3 Waste Management: separate waste materials for reuse and recycling.

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

.2 Divert unused granular material from landfill to local facility approved by Departmental Representative.

3.05 PROTECTION

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Not Used.

1.03 MEASUREMENT PROCEDURES

.1 Asphalt prime will be measured in square metres at 15 degrees C of cutback asphalt emulsified asphalt actually applied.

.2 Blotter Sand: supply of blotter sand will be measured by weight in tonnes.

.3 Application of Blotter Sand: application of blotter sand will be measured in cubic metres.

1.04 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM D 140/D 140M-09, Standard Practice for Sampling Bituminous Materials.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-16.1-M89, Cutback Asphalts for Road Purposes.
- .2 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used.

1.06 QUALITY ASSURANCE

.1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

1.07 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .1 Arrange points of delivery and quantity to be shipped with vendor
- .2 Make deliveries during normal work hours.

.3 Include copy of orders and instructions respecting shipment upon request by Departmental Representative.
.4 Include suitable unloading facilities and unload asphalt as directed Departmental Representative.
.5 Provide, maintain and restore asphalt storage area.

.3 Storage and Handling Requirements:
.1 Deliver, store and handle materials to ASTM D 140.
.2 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.3 Store and protect asphalt prime coats from nicks, scratches, and blemishes.
.4 Replace defective or damaged materials with new.

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

.5 Packaging Waste Management: remove for reuse and return by manufacturer as specified in Construction Waste Management Plan.

2 PRODUCTS

2.01 MATERIAL

.1 Asphalt material: to CAN/CGSB-16.1 grade: RM-20 MC-30 MC-250. CAN/CGSB-16.2 grade: SS-1.

.2 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.

.3 Water: clean, potable, free from foreign matter.

2.02 EQUIPMENT

.1 Pressure distributor:
.1 Designed, equipped, maintained and operated so that asphalt material can be:
.1 Maintained at even temperature.
.2 Applied uniformly on variable widths of surface up to 5 m.
.3 Applied at controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and allowable variation from any specified rate not exceeding 0.1 L/m².
.4 Distributed in uniform spray without atomization at temperature required.

.2 Equipped with metre registering travel distance in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.3 Equipped with pump having flow metre graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator.
.1 Pump power unit to be independent of truck power unit.

.4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
.1 Temperature to be measured to nearest whole number.

.5 Equipped with accurate volume measuring device or calibrated tank.

.6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

.2 Aggregate Spreader:
.1 Apply blotter sand to primed surfaces using roll type spreader, or rotating disc sander capable of applying aggregate at variable widths and at variable rates.

3 EXECUTION

3.01 EXAMINATION

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

3.02 APPLICATION

.1 Proceed with application of tack coat only after receipt of written approval of granular base surface from Departmental Representative.

.2 Cutback asphalt:
.1 Apply asphalt prime to granular base at rate as directed by Departmental Representative.
.2 Apply on dry surface unless otherwise directed by Departmental Representative.

.3 Anionic emulsified asphalt:
- .1 Dilute asphalt emulsion with clean water at 1: 1 ratio for application.
- .2 Mix thoroughly by pumping or other method approved by Departmental Representative.
- .3 Apply diluted asphalt emulsion at rate directed by Departmental Representative but do not exceed 5 L/m².
- .4 Apply diluted asphalt emulsion on damp surface unless otherwise directed by Departmental Representative.

.4 Apply asphalt prime only on unfrozen surface.

.5 Apply asphalt tack coat only when air temperature is greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.

.6 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt prime material.

.7 Where traffic is to be maintained, treat no more than one-half width of surface in one application.

.8 Prevent overlap at junction of applications.

.9 Do not prime surfaces that will be visible when paving is complete.

.10 Apply additional material to areas not sufficiently covered as directed by Departmental Representative.

.11 Keep traffic off primed areas until asphalt prime has cured or set.
- .1 Control traffic in accordance with Section 01 35 00.06 - Special Procedures for Traffic Control.

.12 Permit prime to set before placing asphalt paving.

3.03 USE OF SAND BLOTTER

.1 If asphalt prime fails to penetrate within 24 hours, spread sand blotter material in amounts required to absorb excess material.

.2 Allow sufficient time for excess prime to be absorbed as directed by Departmental Representative.

.3 Apply second application of sand blotter as required.

.4 Do not roll blotter sand.

.5 Sweep and remove excess blotter material.

3.04 CLEANING

.1 Progress Cleaning:
  .1 Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling:
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

.1 Notify Departmental Representative and supplier authorized to release material of proposed date for use of materials; order and schedule shipments to coincide with construction schedule.

1.03 MEASUREMENT AND PAYMENT

.1 Measure asphalt concrete paving in tonnes of asphalt concrete actually incorporated into Work.

.2 Measure supply of asphalt cement in tonnes.

.3 Measure supply of hydrated lime in tonnes.

1.04 REFERENCE STANDARDS

.1 American Association of State Highway and Transportation Officials (AASHTO)
- .1 AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.
- .2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
- .3 AASHTO T245-97(2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

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

.3 ASTM International
- .1 ASTM C 88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- .2 ASTM C 117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C 123-04, Standard Test Method for Lightweight Particles in Aggregate.
- .4 ASTM C 127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
- .5 ASTM C 128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
- .6 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles

Machine.

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

.8 ASTM C 207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.

.9 ASTM D 995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.10 ASTM D 2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.11 ASTM D 3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.12 ASTM D 4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.4 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.

.5 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C 2 weeks prior to beginning Work.

.3 Test and Evaluation Reports:

.4 Certificates:

.1 Certification to be marked on pipe.

.5 Test and Evaluation Reports:

.1 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.

.2 Submit manufacturer's test data and certification that hydrated lime meets specified requirements.

.3 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for approval/review at least 2 weeks prior to beginning Work.

.4 Submit printed record of mix temperatures at end of each day.

.6 Sustainable Design Submittals:
- .1 Construction Waste Management:
  - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
- .2 Recycled Content:
  - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products and total cost of materials for project.
  - .2 Submit evidence, when Supplementary Cementing Materials (SCMs) are used, to certify reduction in cement from Base Mix to Actual SCMs Mix, as percentage.

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials.

.3 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.4 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.

.5 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

.6 Submit to Departmental Representative copies of freight and waybills for asphalt cement as shipments are received.
- .1 Departmental Representative reserves right to check weights as material is received.

.7 Stockpile crushed RAP separately in accordance with Section 31 05 16 - Aggregate Materials where directed by Departmental Representative.

.8 Protect and cover stockpiles of crushed RAP from rain to approval of Departmental Representative.

.9 Develop Construction Waste Management Plan related to Work of this Section.

.10 Packaging Waste Management: remove for reuse and return by manufacturer.

2 PRODUCTS

2.01 MATERIALS

.1 Performance graded asphalt cement: to AASHTO M320, grade PG 58 - 28 when tested to AASHTO R29.

.2 Aggregates: in accordance with Section 31 05 16 - Aggregate Materials: General and requirements as follows:

.1 Crushed stone or gravel.

.2 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing		
	Lower Course	Surface Course	Sheet Asphalt
200 mm	-	-	-
75 mm	-	-	-
50 mm	-	-	-
38.1 mm	-	-	-
25 mm	100	-	-
19 mm	-	-	-
12.5 mm	70-85	100	-
9.5 mm	-	-	100
4.75 mm	40-65	55-75	85-100
2.00 mm	30-50	35-55	80-95
0.425 mm	15-30	15-30	40-70
0.180 mm	5-20	5-20	10-35
0.075 mm	3-8	3-8	4-14

.4 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C 136.

.5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.

.6 Separate stockpiles for coarse and fine aggregates not required for sheet asphalt.

.7 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.8 Sand equivalent: ASTM D 2419. Min: 50 .

.9 Magnesium Sulphate soundness: to ASTM C 88. Max % loss by mass:

.1 Coarse aggregate surface course: 12%.

.2 Coarse aggregate lower course: 12%.

.3 Fine aggregate, surface course: 16%.

.4 Fine aggregate, lower course: 16%.

.10 Los Angeles degradation: Grading B, to ASTM C 131. Max % loss by mass:

.1 Coarse aggregate, surface course: 25%.
.2 Coarse aggregate, lower course: 35%.

.11 Absorption: to ASTM C 127. Max % by mass:
.1 Coarse aggregate, surface course: 1.75%.
.2 Coarse aggregate, lower course: 2.00%.

.12 Loss by washing: to ASTM C 117. Max % passing 0.075 mm sieve:
.1 Coarse aggregate, surface course: 1.5%.
.2 Coarse aggregate, lower course: 2.0%.

.13 Lightweight particles: to ASTM C 123. Max % by mass less than 1.95 relative density:
.1 Surface course: 1.5%.
.2 Lower course: 3.0%.

.14 Flat and elongated particles: to ASTM D 4791, (with length to thickness ratio greater than 5): Max % by mass:
.1 Coarse aggregate, surface course: 15%.
.2 Coarse aggregate, lower course: 15%.

.15 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have 1 minimum freshly fractured face. Material to be divided into ranges, using methods of ASTM C 136.

Passing		Retained on
25 mm	to	12.5 mm

.16 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.4 Mineral filler:
.1 Ensure finely ground particles of limestone, hydrated lime, Portland cement or non-plastic mineral matter approved by Departmental Representative are thoroughly dry and free from lumps.
.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Departmental Representative to improve mix properties.
.3 Ensure mineral filler is dry and free flowing when added to aggregate.

.5 Anti-stripping agent: hydrated lime to ASTM C 207 type N.
.1 Add lime at rate of approximately 2-3% of dry weight of aggregate.

.6 Water: to approval of Departmental Representative.

2.02 EQUIPMENT

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:

.1 Drum diameter: 1200 mm minimum.
.2 Amplitude of vibration (machine setting): 0.5 mm maximum for lifts less than 40 mm thick.

.4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
.1 Boxes with tight metal bottoms.
.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
.3 In cool weather or for long hauls, insulate entire contact area of each truck box.
.4 Use only trucks which can be weighed in single operation on scales supplied.

.5 Hand tools:
.1 Lutes or rakes with covered teeth for spreading and finishing operations.
.2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cmý for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative may be used instead of tamping irons.
.3 Straight edges, 4.5 m in length, to test finished surface.

.6 Plant testing facility: provide laboratory space at plant site for exclusive use of Departmental Representative for performing tests, keeping records and making reports.

2.03 MIX DESIGN

.1 Mix design to be provided and approved in writing by Departmental Representative.

.2 Mix design to be developed by testing laboratory approved in writing by Departmental Representative.

.3 Mix to contain maximum 50% by mass of RAP. Departmental Representative may approve higher proportion of RAP if Contractor demonstrates ability to produce mix meeting requirements of specification.

.4 Design of mix: by Marshall method to requirements below.
.1 Compaction blows on each face of test specimens: 50 75.
.2 Mix physical requirements:

Property	Airfield Pavements	Roads	Sheet Asphalt
Marshall Stability at 60 degrees C kN min	7.0	5.5 surface course/4.5 lower course	3.0
Flow Value mm	2-4	2-4	2-5

Air Voids in Mixture, %	3-5	3-5 surface course/2-6 lower course	3-5
Voids in Mineral Aggregate, % min	15 surface course/13 lower course	15 surface course/13 lower course	16
Index of Retained Stability % minimum	75	75	75

.3 Measure physical requirements as follows:
- .1 Marshall load and flow value: to AASHTO T245.
- .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C 127 and ASTM C 128. Make allowance for volume of asphalt absorbed into pores of aggregate.
- .3 Air voids: to ASTM D 3203.
- .4 Voids in mineral aggregates: to AI MS2.
- .5 Index of Retained Stability: measure in accordance with Section 32 12 10 - Marshall Immersion Test for Bitumen.

.4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be approved by Departmental Representative.

.5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

3 EXECUTION

3.01 EXAMINATION

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

3.02 PLANT AND MIXING REQUIREMENTS

.1 Batch and continuous mixing plants:
- .1 To ASTM D 995.
- .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.
  - .1 Do not load frozen materials into bins.
- .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
- .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.5 Before mixing, dry aggregates to moisture content not greater than 1% by mass or to lesser moisture content if required to meet mix design requirements. Heat to temperature required to meet mixing temperature as directed by Departmental Representative.

.6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.7 Store hot screened aggregates in manner to minimize segregation and temperature loss.

.8 Heat asphalt cement and aggregate to mixing temperature directed by Departmental Representative. Do not heat asphalt cement above maximum temperature indicated on temperature-viscosity chart.

.9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to approve temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.

.11 Mixing time:

.1 In batch plants, both dry and wet mixing times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.

.2 In continuous mixing plants, mixing time as directed by Departmental Representative but not less than 45s.

.3 Mixing time as directed by Departmental Representative.

.2 Dryer drum mixing plant:

.1 To ASTM D 995.

.2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.

.3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.4 Meter total flow of aggregate using electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump to ensure proportions of aggregate prepare and asphalt entering mixer remain constant.

.5 Allow for easy calibration of weighing systems for aggregates without having material enter mixer.

.6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.1 Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time.

.2 Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.

.7 Make provision for conveniently sampling full flow of materials from cold feed.

.8 Provide screens or other suitable devices to reject oversize particles or

lumps of aggregate from cold feed prior to entering drum.

.9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.

.10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream.

.1 Control heating to prevent fracture of aggregate or excessive oxidation of asphalt.

.2 Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator.

.3 Submit printed record of mix temperatures at end of each day.

.11 Ensure mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer is 2% maximum.

.3 Temporary storage of hot mix:

.1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.

.2 Do not store asphalt mix in storage bins in excess of 3 hours.

.4 While producing asphalt mix for this Project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.

.5 Mixing tolerances:

.1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve and larger	
2.00 mm sieve	
0.425 mm sieve	
0.180 mm sieve	
0.075 mm sieve	2.0

.2 Permissible variation of asphalt cement from job mix: 0.25%.

.3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

.6 Addition of anti-stripping agent:

.1 Plant to be equipped with pug mill to thoroughly mix aggregates and lime prior to entering the plant.

.2 Plant to be equipped with suitable conveyor systems capable of supplying aggregates and lime at constant rate.

.3 Plant and equipment used for addition of lime to be equipped with covers to control loss of lime.

.4 Plant to be equipped to control rate of lime incorporation to within 0.25%.

.5 Add water to aggregate prior to entering pug mill.

.6 Add water to lime sufficiently in advance to permit time to slake prior to entering pug mill.

3.03 PREPARATION

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

.2 Reshape granular roadbed in accordance with Section 32 11 17 - Reshaping Granular Roadbed.

.3 When paving over existing asphalt surface, clean pavement surface in accordance with Section 32 01 11.01 - Pavement Cleaning and Marking Removal.
- .1 When levelling course is not required, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.

.4 Apply prime coat and tack coat in accordance with Section 32 12 13.23 - Asphalt Prime Coats.

.5 Prior to laying mix, clean surfaces of loose and foreign material.

3.04 TRANSPORTATION OF MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required.
- .1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.

.3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light for night placing.

.4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.
- .1 Do not dribble mix into trucks.

.5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.6 Deliver loads continuously in covered vehicles and immediately spread and

compact.

.1 Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 135 degrees C.

3.05 TEST STRIP

.1 Construct and test test strip to approval of Departmental Representative.

.2 For airfield pavement, construct test strip in non-critical area to resolve anticipated problems with equipment, mix behaviour or compaction, prior to starting paving operation.

.3 Construct test strip so that joint finishing techniques can be established.

.4 During construction of test strip, Departmental Representative will establish optimum rolling pattern by taking nuclear densimeter readings and observations to:

.1 Determine sequence and number of passes.
.2 Determine correct operating characteristics of vibratory rollers.
.3 Determine maximum density of asphalt mix.
.4 Ensure smooth surface finish.
.5 Establish actual density achieved by coring in order to determine if additional or other rolling equipment is required to achieve density of not less than 98 % of density obtained with Marshall specimens prepared from samples of mix being used.

3.06 PLACING

.1 Obtain Departmental Representative's approval of base and existing surface and tack coat and prime coat prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines as directed by Departmental Representative.

.3 Placing conditions:

.1 Place asphalt mixtures only when air temperature is 5 degrees C minimum.
.2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
.3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.4 Place asphalt concrete in compacted lifts of thickness as follows:

.1 Levelling course to thicknesses required but not exceeding 50 mm.
.2 Lower course in 1 layer of 100 mm.
.3 Surface course in 1 layer of maximum 60 mm.

.5 Where possible do tapering and levelling where required in lower lifts. Overlap

joints by not less than 300 mm.

.6 Place individual strips no longer than 500 m.

.7 On airport runways and taxiways, aprons and parking lots commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.

.8 Spread and strike off mixture with self propelled mechanical finisher.
- .1 Construct longitudinal joints and edges true to line markings.
  - .1 Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
- .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver.
  - .1 Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
- .3 Maintain constant head of mix in auger chamber of paver during placing.
- .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
- .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
- .6 Correct irregularities in surface of pavement course directly behind paver.
  - .1 Remove excess material forming high spots using shovel or lute.
    - .1 Fill and smooth indented areas with hot mix.
    - .2 Do not broadcast material over such areas.
- .7 Do not throw surplus material on freshly screeded surfaces.

.9 When hand spreading is used:
- .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.
  - .1 Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
- .2 Distribute material uniformly without broad casting material.
- .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes.
  - .1 Reject material that has formed into lumps and does not break down readily.
- .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
- .5 Provide heating equipment to keep hand tools free from asphalt.
  - .1 Control temperature to avoid burning material.
  - .2 Do not use tools at higher temperature than temperature of mix being placed.

3.07 COMPACTING

.1 Roll asphalt continuously using established rolling pattern for test strip and to density of not less than 100% of maximum density determined for test strip.

.2 Do not change rolling pattern unless mix changes or lift thickness changes.
- .1 Change rolling pattern only as directed by Departmental Representative.

.3 Roll asphalt continuously to density not less than 98% of dry blow Marshall density to AASHTO T245.

.4 General:
- .1 Provide at least 2 rollers and as many additional rollers as necessary to achieve specified pavement density. When more than 2 rollers are required, 1 roller must be pneumatic tired type.
- .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
- .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
- .4 Use static compaction for levelling coarse less than 25 mm thick.
- .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
- .6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
- .7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
- .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
- .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
- .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.
  - .1 Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
- .11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
- .12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.5 Breakdown rolling:
- .1 Begin breakdown rolling with static steel wheeled roller/vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
- .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
- .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.

.4 Use only experienced roller operators.

.6 Intermediate rolling:
- .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
- .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.7 Finish rolling:
- .1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks.
  - .1 If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
- .2 Conduct rolling operations in close sequence.

.8 Dust entire area of sheet asphalt pavements with hydrated lime immediately after rolling to eliminate tendency to pick-up under traffic.

3.08 JOINTS

.1 General:
- .1 Remove surplus material from surface of previously laid strip.
  - .1 Do not deposit on surface of freshly laid strip.
- .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
- .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:
- .1 Offset transverse joint in succeeding lifts by at least 600 mm.
- .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
- .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

.3 Longitudinal joints:
- .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
- .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
  - .1 For airfield runway paving, avoid cold joint construction in mid 30 m of runway.
  - .2 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
- .3 Overlap previously laid strip with spreader by 25 to 50 mm.
- .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

.5 Roll longitudinal joints directly behind paving operation.
.6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

.4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix.
.1 Place and compact joint to ensure joint is smooth and without visible breaks in grade.
.2 Locate feather joints as indicated.

.5 Construct butt joints as indicated.

3.09 FINISH TOLERANCES

.1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.

.2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.10 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
.1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.

.2 Repair areas showing checking, rippling, or segregation.

.3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.11 CLEANING

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Not Used.

1.03 MEASUREMENT PROCEDURES

.1 Slurry seal coat will be measured in square metres of surface treated.

.2 Slurry seal coat will be measured in tonnes of aggregate and emulsion actually incorporated into work.

.3 Asphalt emulsion will be measured in litres at 15 degrees C of emulsion actually applied.

1.04 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .2 ASTM C 88-13, Standard Test Method for Soundness of Aggregates by Use of Sodium sulphate or Magnesium Sulphate.
- .3 ASTM D140/D140M-09, Standard Practice for Sampling Bituminous Materials.
- .4 ASTM D 2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .5 ASTM D 3910-11, Standard Practice for Design, Testing and Construction of Slurry Seal.
- .6 ASTM D 4318-10, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.
- .2 CAN/CGSB-16.4-M89, Emulsified Asphalts, Cationic Type, for Road Purposes.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.06 DELIVERY, STORAGE AND HANDLING

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

.2 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 Replace defective or damaged materials with new.

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

2 PRODUCTS

2.01 MATERIALS

.1 Emulsified asphalt: to CAN/CGSB-16.2, grade SS-1 SS-1h RS-1 CAN/CGSB-16.4, grade CQS-1h.

.2 Aggregate: to Section 31 05 16 - Aggregate Materials and following requirements:
.1 Crushed stone or gravel.
.2 Gradation: to ASTM D 3910, Type 1.
.3 Plasticity index: to ASTM D 4318, maximum 4.
.4 Los Angeles Degradation: to ASTM C 131, maximum 35%. and
.5 ASTM C 88.

.3 Mineral filler: when required, to ASTM D 3910.

.4 Sand equivalent of combined aggregate and mineral filler: to ASTM D 2419, minimum 45.

.5 Water: clean, potable free from foreign matter.

.6 Additives: to approval of Departmental Representative.

2.02 EQUIPMENT

.1 Slurry seal mixing and spreading equipment: in accordance with ASTM D 3910 and to approval of Departmental Representative.
.1 Use rubber tired vehicle capable of maintaining uniform speed.
.2 Rolling equipment: smooth pneumatic-tired, self-propelled type. Wobble-wheel types not permitted.
.1 Rollers to exert force of at least 3.0 tonnes/m of rolling width.

.2 Minimum contact pressure: 345 kPa.
.3 Rollers to be equipped with water sprinkling apparatus to keep wheels damp to prevent adherence of slurry material.

2.03 JOB MIX FORMULA

.1 Job mix formula approved by Departmental Representative.

.2 Provide report prepared by commercial testing company giving detailed data on trial mixes and design mix selected to Departmental Representative at least 1 week prior to beginning Work.

.3 Wet track abrasion loss of mix not to exceed 800 g/m³ when tested to ASTM D 3910.

3 EXECUTION

3.01 GENERAL

.1 Do asphalt slurry seal work in accordance with ASTM D 3910.

3.02 EXAMINATION

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

3.03 PREPARATION OF PAVEMENT SURFACE

.1 Prepare surface in accordance with ASTM D 3910 and Section 32 01 11.01 - Pavement Cleaning and Marking Removal.

.2 Protect maintenance holes and other service entrances to approval of Departmental Representative.

.3 Pre-wet pavement surface with water as directed by Departmental Representative.

.4 Apply tack coat as directed by the Departmental Representative.

3.04 PREPARATION OF SLURRY MIX

.1 Charge mixer with materials in following order:
- .1 Water,
- .2 Aggregate in unfrozen condition,
- .3 Asphalt emulsion,
- .4 Additives.

.2 When mineral filler is required to obtain required gradation, add slowly to other aggregates before adding asphalt emulsion.

.3 Mix to produce a uniform coating of aggregate and continue mixing until discharged to spreader box.

.4 Discard batch if Departmental Representative determines that emulsion has broken.

3.05 APPLICATION

.1 Obtain Departmental Representative's approval of existing surface prior to applying slurry seal.

.2 Discharge slurry mix into moving spreader box at a rate to maintain ample supply of mix across width of strike-off squeegee.

.3 Adjust strike-off squeegee to provide average slurry thickness of 3 mm but not exceeding 6 mm.

.4 Use hand squeegees, approved by Departmental Representative, to spread mix in areas not accessible to spreader. Dampen surfaces prior to handwork.

.5 Avoid excessive build-up of slurry material on longitudinal or transverse joints.

.6 Place slurry seal only when temperature of pavement surface is 10 degrees C or above.

.7 Place slurry only when freezing conditions or rain is not expected within 24 hours.

.8 Immediately correct cause of surface irregularities including; streaking, segregation and lumping.

3.06 PATCHING

.1 Repair designated areas by removing and replacing as approved by Departmental Representative.

.2 Hand patch slurry seal coat, using limited squeegee action, only as approved by Departmental Representative.

3.07 CURING

.1 Keep traffic off slurry seal until cured to firm condition.

.2 Where two applications of slurry mix are required, cure initial treatment thoroughly before placing succeeding application.

3.08 ROLLING

.1 Where indicated, roll each application with minimum 5 passes of pneumatic tired roller when slurry has cured sufficiently that clear water can be squeezed from mix.

.2 Increase operating contact pressure if directed by Departmental Representative.

3.09 CLEANING

.1 Progress Cleaning:
  .1 Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Not Used.

1.03 MEASUREMENT PROCEDURES

.1 Measure Portland cement concrete paving in metric cubic metres.

.2 Measure supply of Portland cement in tonnes.

.3 Measure sealing of joints including saw cutting and preparation, in linear metres.

1.04 REFERENCE STANDARDS

.1 ASTM International

- .1 ASTM A 775/A 775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .2 ASTM C 171-07, Standard Specification for Sheet Materials for Curing Concrete.
- .3 ASTM C 260/C 260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
- .4 ASTM C 309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .5 ASTM C 494/C 494M-13, Standard Specification for Chemical Admixtures for Concrete.
- .6 ASTM C666/C666M-03(2008), Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
- .7 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .8 ASTM D 2628-91(2011), Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.
- .9 ASTM D 3569-95(2000), Standard Specification for Joint Sealant, Hot-Applied, Elastomeric, Jet-Fuel-Resistant Type for Portland Cement Concrete Pavements.
- .10 ASTM D 5329-09, Standard Test Methods for Sealants and Fillers, Hot-Applied, For Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.
- .11 ASTM D 6297-13, Standard Specification for Asphaltic Plug Joints for Bridges.
- .12 ASTM D 6690 -12, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

.2 CSA Group
- .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CSA-A3000-13, Cementitious Materials Compendium.
- .3 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
- .4 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for concrete paving material and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit following sampling and testing data:
  - .1 Sieve analysis for gradation of bedding and joint material.
  - .2 Evaluation of cleaning and sealing compound.
- .3 Submit 2 copies of WHMIS MSDS in accordance with Provincial Health and Safety Requirements. Indicate VOC's:
  - .1 For cleaning and sealing compounds.
  - .2 Sealing and caulking compounds.

1.06 QUALITY ASSURANCE

.1 Qualifications:
- .1 Installer: Company or person specializing Portland cement concrete paving approved by manufacturer.

.2 Certifications:
- .1 Submit to Departmental Representative manufacturer's test data and certification that following material meets criteria and requirements of this section prior to starting concrete work:
  - .1 Portland Cement.
  - .2 Blended Hydraulic Cement.
  - .3 Supplementary Cementing Material.
  - .4 Admixtures.
  - .5 Joint Sealants.
  - .6 Curing Materials.
  - .7 Joint Filler.
- .2 Submit certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA A23.1/A23.2, and that mix design is adjusted to prevent alkali aggregate reactivity problems.

1.07 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .1 Unload cement and store in weathertight bins or silos that protect cement from dampness and contamination and provide easy access for inspection and identification of each shipment.
  - .2 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials. Stockpile minimum 50% of total required amount of each size of aggregate prior to commencing mixing operation.
- .2 Replace defective or damaged materials with new.

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

2 PRODUCTS

2.01 DESIGN REQUIREMENTS

.1 Mix design requirements:
- .1 Submit concrete mix design to Departmental Representative for approval 2 weeks prior to commencing work.

2.02 MATERIALS

.1 Portland cement: to CSA A3000.

.2 Aggregates: to CSA A23.1/A23.2 and to following requirements:
- .1 Coarse aggregate:
  - .1 Produce coarse aggregate in at least two separate sizes which, when combined, yields gradation specified. Each component size to form approximately equal percentage of total coarse aggregate.
  - .2 Gradation: to CSA A23.1/A23.2, table 5, nominal size 28-5.
  - .3 Flat and elongated particles: to CSA A23.1/A23.2 (13A) (length to width and width to thickness ratio greater than 3) not to exceed 0.5% by mass.
- .2 Fine aggregate:
  - .1 Gradation: to CSA A23.1/A23.2, Table 1. Material passing 0.160 mm sieve: maximum 5%.
  - .2 Aggregates for use in concrete pavement shall not be susceptible to D-cracking. Unless field experience, aggregate history or prior

laboratory testing have proven otherwise.

.3 Aggregates for use in concrete pavement shall be tested in accordance with ASTM C666/C666M. Test shall be in accordance with Procedure A for a period of 350 cycles.

.3 Supplementary cementing materials: to CSA A3000.

.4 Air entraining admixture: to ASTM C 260/C 260M.

.5 Chemical admixtures: to ASTM C 494/C 494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Curing compound: to ASTM C 309, Type 1-D or 2.

.7 Sheet material for curing: to ASTM C 171, plastic sheets.

.8 Burlap mats for curing: to ASTM C 171.

.9 Joint sealant, hot poured. Bond breaker to Departmental Representative approval.

.10 Joint seal, preformed polychloroprene elastomeric: to ASTM D 2628.

.11 Preformed expansion joint filler: to ASTM D 1752.

.12 Dowels and tie-bars: to CSA G30.18.

.1 Dowels: clean, straight and free from flattened or burred ends, plain round bars of grade 300 or better conforming to CSA G40.20/G40.21 and be epoxy-coated to ASTM A 775/A 775M.

.2 Tie-Bars: deformed steel bars in compliance with CSA G30.18 and be epoxy-coated to ASTM A 775/A 775M.

.13 Protective covers and insulation for cold weather concreting: to CSA A23.1/A23.2.

2.03 MIXES

.1 Job mix formula to be reviewed by Departmental Representative in accordance with Alternative 3 of CSA A23.1/A23.2, Table 13 and as specified below.

.2 For concrete proportioned in accordance with Alternative 1:

.1 Use type 10 cement.

.2 Compressive strength when tested in accordance with CSA A23.1/A23.2, (9C): average 28 day compressive strength to be minimum 35 MPa.

.3 Cementing materials content: 290 to 335 kg/m^3 of concrete mix.

.4 Air content when tested in accordance with CSA A23.1/A23.2, (4C), immediately after discharge: in accordance with CSA A23.1/A23.2, Table 10.

.5 Class of exposure: Class C-2.

.6 Use of chemical admixture will be approved only when specified mix

requirements or workability cannot be achieved by proportioning of aggregates, water, cement and air entraining admixture.

.3 For concrete proportioned in accordance with Alternative 2:
- .1 Use type 10 cement.
- .2 Cementing materials content: 335 kg/m³ of concrete mix.
- .3 Coarse to fine aggregate ratio: coarse aggregate to comprise 60 to 70% by mass of combined aggregate.
- .4 Maximum total water /cement ratio: 0.45 (including moisture in aggregates): 140 kg/m³ of concrete mix.
- .5 Slump at point of discharge when tested in accordance with CSA A23.1/A23.2, (5C): 10 to 50 mm.
- .6 Air content when tested in accordance with CSA A23.1/A23.2, (4C), immediately after discharge: 4-6%.

.4 Proposed changes in material source to be approved by Departmental Representative. New mix design to be approved by Departmental Representative.

.5 Departmental Representative to carry out 7 day strength tests. If average strength at 7 days is less than 70% of specified minimum 28 day strength, check mix at once and adjust to ensure required strength is obtained.

3 EXECUTION

3.01 EXAMINATION

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

3.02 EQUIPMENT

.1 Concrete plant: in accordance with CSA A23.1/A23.2.

.2 Where fixed form paving is used provide equipment with following features:
- .1 Mechanical self-propelled spreader capable of moving concrete forward and laterally.
- .2 Vibrator locations and spacings whether surface or internal to be installed as per manufacturer's specifications or as directed by the Departmental Representative.
- .3 Mechanical, self-propelled finisher with two independently operated transverse screeds.

.4 Float to be aluminum or magnesium, straight, smooth, sufficiently light to avoid sinking into concrete surface, operated mechanically or manually from edge to edge while advancing longitudinally.

.3 Where slip form paving is used provide equipment with following features:
- .1 Self-propelled slip form paver with crawler type tracks, designed to spread, consolidate, screed and float finish fresh concrete to required cross section, lines and grades. Paver to be approved by Departmental Representative.
- .2 Pavement line and surface elevation to be automatically controlled by laser equipment.
- .3 Internal type vibrators: to be installed and arranged as per manufacturer's specifications.

.4 Use following equipment on approval of Departmental Representative:
- .1 Hand operated transverse screeds spanning side forms.
- .2 Mechanically powered vibrating beam spanning side forms.
- .3 Hand operated floats and fluting tools used by skilled workers.

.5 Provide following miscellaneous equipment where required:
- .1 Edging tool.
- .2 Water truck equipped with pump, hose line and fine spray nozzle.
- .3 Self-propelled automatic spray machine spanning fresh concrete, equipped with fine spray nozzles suitable for application of membrane curing compound uniformly over surface and exposed edges, and with wind skirt to permit proper application during windy conditions.
- .4 Self-propelled concrete saws equipped with rubber-tired wheels, readily adjustable blade depth controls, and sawing line guide pointers both front and rear. Provide adequate number of units to complete sawing at rate required and have ample supply of suitable saw blades and at least one standby sawing unit available on job site before concrete placement is started.
- .5 Heating kettle or tank for heating sealing compound:
  - .1 Double boiler with space between inner and outer shells filled with oil, asphalt or other material for heat transfer.
  - .2 Equip for positive temperature control of sealing compound.
  - .3 Equip with readily calibrated device which accurately registers temperature of sealing compound.

3.03 FORMWORK

.1 Install to following requirements:
- .1 For fixed form paving:
  - .1 Provide steel forms of sufficient strength to support and keep alignment under weight of spreading and finishing machines.
  - .2 Use of wood forms for fillet areas to be approved by Departmental Representative.
  - .3 Set forms true to line and grade, join neatly and tightly and stake

securely to resist concrete pressure and impact from tampers without springing.

.4 Clean and oil forms before each use.

.5 Obtain Departmental Representative approval of forms before placing concrete.

.2 For slip form paving:

.1 Provide sufficient length of slip form trailing behind paver to prevent slumping at slab edge. Ensure rigid lateral support.

.2 Set grade and line for laser equipment from bench marks/line and grade established by Departmental Representative.

3.04 SUBGRADE AND SUBBASE PREPARATION

.1 Soft, yielding materials or other portions of subgrade that will not compact to specification shall be removed and replaced with suitable material. Subgrade to be brought to a firm unyielding condition with a uniform density. It shall be compacted at or above optimum moisture content to 95% Standard Proctor density.

.2 When concrete is placed directly on subgrade, it will be checked for conformity with the cross-section tolerance. Finished surface shall not deviate more than 0 mm above and 20 mm below specified grade and cross-section, and the surface shall not deviate more than 10 mm at any place on a 3 mm template.

.3 Subbase to consist of specified material and have a compacted thickness of not less than specified.

.4 For slip-form paving, subbase travelled by tracks in paving machine shall be firm and have a smooth surface.

.5 Subbase shall be compacted to specified density.

.6 Prepared subbase shall be checked for conformity with the cross-section and grad tolerances. Finished surface of subbase shall not deviate more than 0 mm above and 20 mm below specified grade and cross-section, and surface shall not deviate more than 10 mm at any place on a 3 mm template.

.7 Repair damage to subbase resulting from hauling or equipment operations.

.8 Prior to placing concrete, subbase shall be thoroughly wetted. Wetting shall be carried out, such that standing water is not present on grade.

.9 Surface condition of base to be approved by Departmental Representative before placing concrete.

3.05 REINFORCING STEEL AND DOWELS

.1 Not Used.

3.06 PLANT AND MIXING REQUIREMENTS

.1 If crusher screenings are approved as mixture component, proportion separately from sand.

.2 If washing of aggregate required, allow aggregate to drain for 24 hours or longer as required to stabilize moisture content.

.3 For truck mixers, mixing to be in accordance with CSA A23.1/A23.2.

.4 Mix produced to be within following tolerances from mix design:
- .1 Air content: as per CSA A23.1/A23.2, Table 10.

3.07 TRANSPORT AND DELIVERY OF MIX

.1 Time from initial mixing to final placing to be not more than 120 minutes if mix is transported by agitating equipment (e.g. truck mixer) in accordance with CSA A23.1/A23.2, clause 18.4.2 - Delivery with Agitating Equipment.

.2 Transport mix by non-agitating equipment only if;
- .1 Time from addition of cement to time of placing not to exceed 45 minutes.
- .2 Haul units to be of sufficient capacity to transport at least one regular size batch from mixer.
- .3 Haul routes to be well maintained to prevent undue disturbance of concrete mix during transport.

3.08 PLACING

.1 Place concrete to lines, grades and depths as indicated.

.2 Discharge concrete into forms as soon as practical after mixing.

.3 Construct pavement lanes in sequence approved by Departmental Representative.

.4 Use hand placing where machine spreading is not feasible.

.5 Spread uniformly with approved equipment to thickness sufficient to allow for proper consolidation and finishing. Do not apply external tractive force to paver.

.6 Operate with continuous forward momentum. Schedule concrete supply to minimize interruptions.

.7 Insert tie bars as indicated.

.8 When completing concrete placement for day, carry placement through to scheduled control, contraction joint location.

.9 Where concrete placement is stopped for more than 30 min due to breakdowns, weather or other reasons, construct extra bulkhead and construction joint as directed by Departmental Representative.

.10 Do not place concrete on frozen surface.

.11 No concrete shall be placed during rain.

.12 When rain appears imminent paving operation should cease. Protect freshly laid concrete from rain damage and adverse weather condition and in accordance with CSA A23.1/A23.2. Extend protective coverings over edges of concrete and arrange so as not to bear on unprotected edges.

.13 Concrete placed when the ambient temperature is at or above 27 degrees C to be cured by continuous water curing from soaker hoses providing complete coverage of the pavement to minimize the temperature rise of the concrete.

.14 When concrete has been placed in cold weather and the sire temperature is expected to drop below 5 degrees C, insulating curing blankets or other suitable material shall be placed on the concrete pavement and weighted to prevent movement. Curing to continue until the cumulative number of days, or fraction thereof, during which the temperature of the concrete is above 10 degrees C, has totalled a minimum of 7 days. Alternatively, if compressive tests of cylinders cured under field conditions achieve at least 70% of the specified compressive strength, curing may be discontinued.

.15 Concrete pavement placed in cool weather shall experience a minimum of 30 day air-drying period, following final curing, before first application of de-icing salts.

3.09 CONSOLIDATION

.1 When internal vibrators are used:
- .1 For slab depths up to 50 mm, mount vibrators parallel to base at mid depth. For slab depths greater than 50 mm, mount vibrators with tips minimum 50 mm above base and tops minimum 50 mm beneath pavement surface.
- .2 Operate at manufacturer's recommended number of vibrations and specifications.

.2 When surface vibrators are used:
- .1 Synchronize units on each individual screed or pan.
- .2 Operate at minimum of 3,500 vibrations per minute and minimum amplitude of 0.4 mm.
- .3 Treat each pavement section to at least 1 pass of vibratory equipment unless otherwise directed by Departmental Representative.

.3 Stop vibrators when paver stops.

.4 Use hand operated vibrator on odd shaped slabs inaccessible to frame mounted

units. Do not operate vibrator in one location longer than 5 seconds.

.5 Ensure concrete adjacent to edge forms or previously constructed slabs is thoroughly vibrated.

3.10 FINISHING

.1 After consolidation by vibration, finish with equipment approved by Departmental Representative.

.2 When striking off concrete surface, maintain uniform roll of concrete ahead of first screed for its full length when finishing machine is on first pass.

.3 Make 2 passes with transverse finishing machine.

.4 Where joints are formed rather than sawn, form longitudinal and transverse joints after final pass of finishing machine.

.5 Hand finish areas inaccessible to finishing machines to same quality and surface characteristics as machine finished surfaces.

.6 Finish concrete surface with approved float at proper time. Operate from edge to edge with wiping motion while advancing, with each succeeding pass overlapping previous one.

.7 Check surface with approved 3.5 m long straightedge. Correct irregularities exceeding 5 mm before concrete takes initial set.

.8 Finish edges of slabs with edging tool to form smooth squared surface. Do not patch with cement paste.

3.11 SURFACE TEXTURING

.1 Commence texturing immediately after float finishing.

.2 Use moistened burlap drag/stiff bristled broom/AstroTurf drag to produce nonslip concrete surface finish approved by Departmental Representative, with fine granular texture free from disfigurations to meet existing finish.

.3 Provide surface texture by transverse wire comb leaving grooves in surface of plastic concrete as per American Concrete Pavement Association publications.

.4 Provide transverse surface texture by self-propelled machine specifically designed for purpose, automatically controlled from stringline reference used by paver, to produce an average surface texture as per American Concrete Pavement Association publication - Constructing Smooth Concrete Pavement.

.5 Texturing to be straight, precise and not damaging to pavement edges.

3.12 CURING

.1 Cure for minimum 7 days by one of following methods:
- .1 Curing compound:
  - .1 Apply in two coats with approved spray equipment to form complete and unbroken film on surface of concrete. Mechanically agitate compound before and during use.
  - .2 For hand application apply first coat immediately after texturing operations, second coat to be applied immediately after first coat in a perpendicular direction.
  - .3 For machine application curing compound to be applied in accordance with manufacturers' specifications.
  - .4 Apply second spray within 24 hours of first in accordance with manufacturer's instructions.
  - .5 Apply each spray at application rate recommended by manufacturer.
  - .6 Spray slab edges immediately after removal of forms.
  - .7 Protect formed or sawed joints from evaporation during curing period.
  - .8 Respray areas where membrane is damaged during curing period.
- .2 Burlap or cotton mats:
  - .1 As soon as concrete surface has been finished and can bear weight without marking, carefully cover with burlap or cotton mats.
  - .2 Place mats to overlap each other by 300 mm or more and to overlap concrete slab by 300 mm or more at each side secured by a continuous bank of sand and gravel.
  - .3 Cover sides and ends of slab with mats as soon as forms are removed.
  - .4 Thoroughly wet mats before placing them on concrete and keep saturated during curing period with water spray sufficiently fine to avoid damaging concrete surface, avoiding wet/dry cycles.

3.13 PROTECTION

.1 Do not open concrete pavement to traffic or construction equipment until concrete reaches a minimum compressive strength of 35 MPa unless fast track concrete procedure is used or approved by Departmental Representative and joints have been sealed.

.2 When placing concrete in lanes adjacent to existing concrete, operate placing equipment on rubber wheels or pads to prevent damage to existing surface.

3.14 TOLERANCES

.1 Finished concrete surface to be within 5 mm of design grade but not uniformly high or low.

.2 Finished concrete surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

.3 Horizontal deviations of slab edge from alignment of pavement not to exceed 10 mm.

3.15 JOINTS

.1 General:
- .1 Construct joints plumb, straight and square to details indicated.
- .2 Transverse joints to coincide with those in adjacent pavement unless indicated or directed otherwise.
- .3 Install preformed joint filler at locations and to details indicated.
- .4 Install isolation joints around structures and features that project through, into or against pavement.

.2 For sawn joints.
- .1 Ensure joints are sawn straight. Install end stakes to ensure straight joint alignment across paved area. Mark joint alignment with chalk line or other suitable guide to approval of Departmental Representative.
- .2 Saw joints using approved equipment and methods to produce joint dimensions indicated.
- .3 Restrict speed of saw cutting to ensure proper joint alignment and to avoid damage to concrete.
- .4 Supply sufficient workers and equipment including standby equipment, to maintain satisfactory sawing schedule.
- .5 Schedule sawing operations on 24 hours basis and consistent with concrete placing.
- .6 Make initial saw cuts in progressive manner and as soon as concrete surface has hardened sufficiently to resist ravelling as cut is made and before shrinkage cracks occurs.
- .7 If cracking occurs ahead of saw cut, stop sawing immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1 m saw cut from one edge and complete sawing from opposite edge. Adjust sawing schedule accordingly.
- .8 If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques suspend further concrete operations until situation is corrected and immediately remove and replace damaged slabs.
- .9 Immediately on completion of sawing, flush joints with water to remove laitance.

.3 Sealing:
- .1 Seal joints before allowing vehicular traffic on new pavement.
- .2 Provide Departmental Representative with copy of sealant manufacturer's instructions for application. Have sealant manufacturer's representative on site during initial 3 days of sealing operation.
- .3 Just prior to sealing joint, clean with compressed air or flush with high

pressure water to remove laitance, curing compound and protrusions of hardened concrete. Clean and dry by compressed air and vacuum to remove loose and foreign material.

.4 Do not apply joint sealant in rainy weather or when ambient temperature is less than 5 degrees C.

.5 Insert approved filler and bond breaking material in joint prior to applying sealant, then fill joint from bottom up with sealant to avoid trapping air.

.6 Prepare sealant for application using equipment and methods approved by Departmental Representative.

.7 Apply sealant strictly in accordance with manufacturer's recommendations with special attention to temperature ranges for safe heating and for application of hot poured sealants and cleanliness of concrete to be bonded.

.8 On completion of first application of sealant, return and top up any underfilled areas.

.9 Replace sealant which fails to bond to concrete or fails to cure properly, as directed by Departmental Representative.

3.16 DEFECTIVE CONCRETE

.1 Concrete is defective when:

.1 It contains: honeycombing, embedded debris, uncontrolled shrinkage cracking, or other surface defects.

.2 It is damaged by freezing.

.3 It is placed at too high temperature.

.4 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.

.5 Any 28 day strength test result is more than 3.5 MPa below the specified minimum 28 day strength.

.6 Standard deviation of 28 day strength test results exceeds CSA A23.1/A23.2 clause 17.6.7.1 requirements.

3.17 REPAIR/RESTORATION

.1 Repair of defective concrete work:

.1 Where defective concrete is identified by Departmental Representative during plastic condition, repair using methods approved by Departmental Representative.

.2 Grind off high surface variations where directed by Departmental Representative.

.2 Remove and replace defective concrete where directed by Departmental Representative.

.1 Remove minimum 3 m of pavement by sawing through concrete across full lane width.

.2 Replace with new concrete to this specification.

.3 Construct contraction joint at boundary between sawn face of existing concrete and new concrete.

.4 Install dowel bars and tie bars between old and new concrete as directed by Departmental Representative.

3.18 CLEANING

.1 Progress Cleaning:
  .1 Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.19 PROTECTION

.1 Keep vehicular traffic off newly paved areas until paving has properly cured and joints have been sealed.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Existing pavers (one lane only in Douglas Port of Entry) are to be removed and re installed after new conduit installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Not Used.

1.02 REFERENCE STANDARDS

.1 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.

.2 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.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 47 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.01 SUSTAINABLE REQUIREMENTS

.1 Not Used.

2.02 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 Joint filler Curing Compound: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.4 Granular base: material to Section 31 05 16 - Aggregate Materials and following requirements:
- .1 Type 1, 2 or 3 fill.
- .2 Crushed stone or gravel.
- .3 Gradations: within limits specified when tested to ASTM C 136 and

ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

.5 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.

.6 Fill material: to Section 31 05 16 - Aggregate Materials and following requirements:
- .1 Type 1, 2 or 3 fill.
- .2 Crushed stone or gravel.
- .3 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

.7 Boiled linseed oil: to ASTM D 260

.8 Kerosene: to CAN/CGSB-3.3.

3 EXECUTION

3.01 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.
- .1 Dispose of surplus and unsuitable excavated material in approved location on site off site.

.3 When constructing embankment provide for minimum 300 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.

3.02 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 ASTMD 698.

3.03 CONCRETE

.1 Obtain Departmental Representative approval of granular base and reinforcing steel 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.

3.04 TOLERANCES

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

3.05 EXPANSION AND CONTRACTION JOINTS

.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals as indicated.

.2 Install expansion joints as indicated by Departmental Representative.

.3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.06 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 as indicated.

.3 Seal isolation joints with sealant approved by Departmental Representative.

3.07 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 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

.3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.08 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 directed by Departmental Representative.

3.09 LINSEED OIL TREATMENT

.1 Apply two coats of linseed oil mixture uniformly to surfaces of curbs, walks and gutters, after concrete has cured for specified curing time and when surface of concrete is clean and dry.

.2 Linseed oil mixture to consist of 50% boiled linseed oil and 50% mineral spirits by volume.

.3 Apply treatment when air temperature above 10 degrees C.

.4 Apply first coat at 135 mL/m^3

.5 Apply second coat at 90 m^3 when first coat has dried.

3.10 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

1 GENERAL

1.01 MEASUREMENT FOR PAYMENT

.1 Pavement marking: measured by lump sum.

.2 Pavement marking including reflective glass beads: measured by lump sum.

.3 Supply of paint: measured in litres.

.4 Supply of reflective glass beads: measured in kilograms.

.5 Symbols and letters: measured in units.

1.02 REFERENCE STANDARDS

.1 Environment Canada (EC)
- .1 Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations, SOR/2009-264.

.2 Green Seal (GS)
- .1 GS-11-2013, Standard for Paints and Coatings.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

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

.5 South Coast Air Quality Management District (SCAQMD)
- .1 SCAQMD Rule 1113-13, Architectural Coatings.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used.

1.04 CLOSEOUT SUBMITTALS

.1 Not Used.

1.05 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect specified materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan elated to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer as specified in Construction Waste Management Plan.

1.06 SITE CONDITIONS

.1 Sustainable Design Provisions:
- .1 Seasonal restriction for high VOC content traffic marking coatings.
  - .1 Traffic marking coating application between May 1st and October 15th is subject to seasonal use restriction and must not have a VOC concentration in excess of 150 g/L.

2 PRODUCTS

2.01 MATERIALS

.1 Paint and Markings:
- .1 To MPI #32, Alkyd zone/traffic marking.
- .2 Traffic Marking Coatings: maximum VOC limit 450 g/L to SOR/2009-264 Schedule 1and to GS-11 Standard to SCAQMD Rule 1113
- .3 Paints: in accordance with MPI recommendation for surface conditions.
- .4 Colour: to MPI listed, yellow black white.
- .5 Upon request, Departmental Representative will supply qualified product list of paints applicable to work. Qualified paints may be used but Departmental Representative reserves right to perform further tests.

.2 Thinner: to MPI listed manufacturer.

.3 Glass reflective beads: type suitable for application to wet paint surface for light reflectance.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation in accordance with MPI instructions prior to pavement markings installation.
- .1 Visually inspect substrate in presence of Departmental Representative.

.2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.

.3 Proceed with Work only after unacceptable conditions have been rectified.

3.02 EQUIPMENT REQUIREMENTS

.1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

.2 Distributor: capable of applying reflective glass beads as overlay on freshly applied paint.

3.03 TRAFFIC CONTROL

.1 Not Used.

3.04 APPLICATION

.1 Pavement markings: laid out by Departmental Representative lay out pavement markings.

.2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.

.3 Apply traffic paint evenly at rate of 3 m^3..

.4 Do not thin paint unless approved by Departmental Representative.

.5 Symbols and letters to dimensions indicated.

.6 Paint lines of uniform colour and density with sharp edges.

.7 Thoroughly clean distributor tank before refilling with paint of different colour.

.8 Apply glass beads at rate of 0.5 kg/L of painted area immediately after application of paint.

3.05 TOLERANCE

.1 Paint markings: within plus or minus 12 mm of dimensions indicated.

.2 Remove incorrect markings in accordance with Section 32 01 11.01 - Pavement Cleaning and Marking Removal.

3.06 CLEANING

.1 Progress Cleaning:
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
  .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

.3 Waste Management: separate waste materials for reuse and recycling.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

.1 Protect pavement markings until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section specifies RPVC and plastic polyethylene pipe used for direct buried underground cable ducts.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 211.1- latest edition, Rigid Types EBI and DB2/ES2 PVC Conduit.

.2 CSA C22.2 No. 211.3- latest edition, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings (Bi-national standard, with UL 1684).

1.3 SUBMITTALS

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

.2 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health and Welfare Canada for solvent cement. Indicate VOC content.

Part 2 Products

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC duct: to CSA C22.2 No. 211.1, Type DB2/ES2, with moulded fittings, for direct burial expanded flange ends, Trade size 100 mm Nominal length: plus or minus 12 mm.

.2 Rigid PVC split ducts.

.3 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.

.4 Rigid PVC 90° and 45° bends.

.5 Rigid PVC 5° angle couplings.

.6 Expansion joints as required.

2.2 SOLVENT WELD COMPOUND

.1 Solvent cement for PVC duct joints with low VOC content, 785 Grams/Liter (g/l). Maximum VOC emission as applied and tested per SCAQMD Rule 1168, Test Method 316A: 510 g/l.

2.3 PLASTIC POLYETHYLENE PIPE

.1 Rigid plastic polyethylene pipe with approved couplings and fittings required to make complete installation.

2.4 CABLE PULLING EQUIPMENT

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.5 MARKERS

.1 Concrete type cable markers: as indicated, with words: "Cable", "Joint" or "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

Part 3 Execution

3.1 INSTALLATION

.1 Install duct in accordance with manufacturer's instructions.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5 m throughout duct length.

.4 Slope ducts with 1 to 400 minimum slope.

.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

.6 Pull through each duct mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

.8 Install markers as required.

END OF SECTION