

SPECIFICATIONS

**Architecture and Engineering Consultant Services
For Cyprus Lake Road Recapitalization
Parks Canada
Bruce Peninsula National Park
Contract 16012**

July, 2016

Prepared By:

**GSS Engineering Consultants Ltd.
Unit 104D, 1010 – 9th Ave, W. Owen Sound, ON
N4K 5R7**

Division 1	General Requirements
01 11 00	Summary of Work
01 29 00	Payment Procedures
01 29 83	Payment Procedures for Testing Laboratory Services
01 33 00	Submittal Procedures
01 35 29.6	Health and Safety Requirements
01 35 43	Environmental Procedures
01 45 00	Quality Control
01 52 00	Construction Facilities
01 56 00	Temporary Barriers and Enclosures
01 71 00	Examination and Preparation
01 78 00	Closeout Submittals
Division 2	Site Work
02 41 13.14	Asphalt Pavement Removal
Division 3	Concrete
03 30 00	Cast-in-Place Concrete
Division 10	Specialties
10 14 53	Traffic Signage
Division 31	Earthwork
31 11 00	Clearing and Grubbing
31 22 00	Grading
31 22 16.13	Reshaping Roadway Subgrade
31 23 16.26	Rock Removal
31 23 19	Dewatering
31 23 33.01	Excavating, Trenching and Backfilling
31 32 25	Erosion and Sedimentation Control
Division 32	Exterior Improvements
32 11 16.01	Granular Sub-base
32 12 13.16	Asphalt Tack Coat
32 12 16	Asphalt Paving
32 17 23	Pavement Marking
Division 33	Utilities
33 42 13	Pipe Culverts

Updated: 2016-07-12 / Approved: 2006-03-31

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 N/A

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises recapitalization of Cyprus Lake Road, located at Northern Bruce Peninsula; and further identified as Cyprus Lake Road from Highway 6 to 5.4 km westerly.
- .2 Schedule of Values, at the back of this Section, provides a more detailed listing of the required Work.

1.3 CONTRACT METHOD

- .1 Construct Work under stipulated contract.
- .2 N/A
- .3 Relations and responsibilities between Contractor and subcontractors assigned by Owner are as defined in Conditions of Contract.

1.4 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Contract Administrator and his designated Assistants.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Contract Administrator, in writing, any defects which may interfere with proper execution of Work.
- .3 Work of Project executed prior to start off during Work of this Contract, and which is specifically excluded from this Contract:
 - .1 N/A
- .4 Work of Project which will be executed after completion of Work of this Contract, and which is specifically excluded from this Contract:
 - .1 N/A
- .5 Work of this Project must include provisions for co-ordinating additional related work, identified in Contract Documents, for following principal items.
 - .1 N/A

1.5 FUTURE WORK

- .1 N/A

1.6 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .3 Required stages:
 - .1 Single lane traffic (with flagmen) must be maintained at all times.
- .4 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- .5 Required stages:
 - .1 As per approved Work Plan.
- .6 Maintain fire access/control.

1.7 CONTRACTOR USE OF PREMISES

- .1 Use of site subject to traffic maintenance provision.
- .2 Limit use of premises for Work to allow:
 - .1 Owner occupancy.
 - .2 Work by other contractors.
 - .3 Public usage.
- .3 Co-ordinate use of premises under direction of Contract Administrator.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Consultant.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.8 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.9 PARTIAL OWNER OCCUPANCY

- .1 N/A

1.10 [PRE-ORDERED PRODUCTS] [PRE-BID WORK]

- .1 N/A

1.11 PRE-PURCHASED EQUIPMENT

- .1 N/A

1.12 OWNER FURNISHED ITEMS

- .1 Owner Responsibilities:
 - .1 Arrange for delivery of instructions to Contractor.
 - .2 Arrange for replacement of damaged, defective or missing items.
- .2 Contractor Responsibilities:
 - .1 Load and deliver eco-structure from the Owner maintenance yard to the installation site.
 - .2 Handle products at site, including uncrating and storage.
 - .3 Protect products from damage, and from exposure to elements.
 - .4 Assemble, install, connect, adjust, and finish products.
 - .5 Provide installation inspections required by public authorities.
 - .6 Repair or replace items damaged by the Contractor or Subcontractor on site (under his control).
- .3 Schedule of Owner furnished items:
 - .1 Eco-structures (Two (2) complete units)

1.13 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 N/A

1.14 EXISTING SERVICES

- .1 N/A
- .2 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .3 Record locations of maintained, re-routed and abandoned service lines.
- .4 Construct barriers in accordance with **Section 01 56 00 - Temporary Barriers and Enclosures.**

1.15 DOCUMENTS REQUIRED

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

- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Schedule of Values

SCHEDULE OF VALUES - JULY, 2016 – CONTRACT 16012

NOTE: THIS CONTRACT IS A LUMP SUM CONTRACT. THE FOLLOWING TABLE IS PROVIDED STRICTLY FOR THE CONVEINENCE OF THE BIDDER TO ASSIST IN ESTIMATING HIS COSTS. THE CONTRACTOR IS RESPONSIBLE TO VERIFY ALL QUANTITIES AND ANY PRICE EXTENSIONS AND TO ENSURE THAT THEY HAVE ACCOUNTED FOR ALL COSTS IN THEIR TENDERED PRICE.

Item no.	Item Description	Quantity or Lump Sum (L.S.)		
1	Mobilization and Demobilization	L.S.		
2	Clearing and grubbing incl. close-cut, clearing and trimming	22,750 m²		
3	Pulverize existing surface treatment, reshape and compact existing road bed	30,500 m²		
4	Earth excavating (mainly stripping)	800 m³		
5	Granular A	11,000 t		
6	Calcium Chloride	5 tonnes		
7	Hot Mix H.L.4	3,854 t		
8	Hot Mix H.L.3	3,082 t		
9	Removal of Existing Culverts	231 m		

Item no.	Item Description (Following)	Quantity or Lump Sum (L.S.)		
10	300 mm Ø Culverts	76 m		
11	375 mm Ø Culverts	130 m		
12	450 mm Ø Culverts	24 m		
13	600 mm Ø Culverts	51 m		
14	750 mm Ø Culverts	13 m		
15	150 Ø Rip Rap with filter fabric	100 m ²		
16	Load, deliver to site eco-structure including excavation, installation and backfill.	2 each		
17	Supply, place and maintain light duty silt fence <u>O.P.S.D. 219.110</u>	700 m		
18	Supply and place Stop signs	3 each		
19	Supply and place stop ahead signs	2 each		
20	Supply and place 25 km signs	6 each		
21	Supply and place 40 km signs	4 each		
22	Supply and place No Parking signs	6		
23	Supply and place bike lane signs	6		
24	Paint 0.10 m wide solid center line	4,950 m		
25	Paint bike lane lines and pavement markings	L.S.		
26	Paint Stop blocks (300 mm wide)	20 m		

END OF SECTION

Updated: 2016-07-12 / Approved: 2006-03-31

Part 1 General

1.1 REFERENCES

- .1 Owner/Contractor Agreement.
- .2 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-1994, Stipulated Price Contract.

1.2 APPLICATIONS FOR PROGRESS PAYMENT

- .1 Refer to CCDC 2.
- .2 Make applications for payment on account as provided in Agreement monthly as Work progresses.
- .3 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.
- .4 Submit to Contract Administrator, at least fourteen (14) days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Price, to facilitate evaluation of applications for payment.

1.3 SCHEDULE OF VALUES

- .1 Refer to CCDC 2.
- .2 Provide schedule of values supported by evidence as Consultant may reasonably direct and when accepted by Consultant, be used as basis for applications for payment.
- .3 Include statement based on schedule of values with each application for payment.
- .4 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Contract Administrator may reasonably require to establish value and delivery of products.

1.4 PREPARING SCHEDULE OF UNIT PRICE TABLE ITEMS

- .1 Submit separate schedule of unit price items of Work requested in Bid form.
- .2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:
 - .1 Cost of material.
 - .2 Delivery and unloading at site.
 - .3 Sales taxes.
 - .4 An example of a Unit Price Table is shown in Part 3 of Section 01 11 00.
 - .5 Installation, overhead and profit.
- .3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.5 PROGRESS PAYMENT

- .1 Refer to CCDC 2.
- .2 Consultant will issue to Owner, no later than ten (10) days after receipt of an application for payment, Certificate for Payment in amount applied for or in such other amount as Contract Administrator determines to be due. If Contract Administrator amends application, Contract Administrator will give notification in writing giving reasons for amendment.

1.6 SUBSTANTIAL PERFORMANCE OF WORK

- .1 Refer to CCDC 2.
- .2 Prepare and submit to Contract Administrator comprehensive list of items to be completed or corrected and apply for a review by Contract Administrator to establish Substantial Performance of Work or substantial performance of designated portion of Work when Work is substantially performed if permitted by lien legislation applicable to Place of Work designated portion which Owner agrees to accept separately is substantially performed. Failure to include items on list does not alter responsibility to complete Contract.
- .3 No later than ten (10) days after receipt of list and application, Contract Administrator will review Work to verify validity of application, and no later than seven (7) days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.
- .4 Contract Administrator: state date of Substantial Performance of Work or designated portion of Work in certificate.
- .5 Immediately following issuance of Certificate of Substantial Performance of Work, in consultation with Contract Administrator, establish reasonable date for finishing Work.

1.7 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

- .1 Refer to CCDC 2.
- .2 After issuance of Certificate of Substantial Performance of Work:
 - .1 Submit application for payment of holdback amount.
 - .2 Submit sworn statement that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.
- .3 After receipt of application for payment and sworn statement, Contract Administrator will issue Certificate for Payment of Holdback Amount.
- .4 Where holdback amount has not been placed in a separate holdback account, Owner shall, ten (10) days prior to expiry of holdback period stipulated in lien legislation applicable to Place of Work, place holdback amount in bank account in joint names of Owner and Contractor.

- .5 Amount authorized by Certificate for Payment of Holdback Amount is due and payable on day following expiration of holdback period stipulated in lien legislation applicable to Place of Work. Where lien legislation does not exist or apply, holdback amount is due and payable in accordance with other legislation, industry practice, or provisions which may be agreed to between parties. Owner may retain out of holdback amount sums required by law to satisfy liens against Work or, if permitted by lien legislation applicable to Place of Work, other third party monetary claims against Contract Administrator which are enforceable against Owner.

1.8 PROGRESSIVE RELEASE OF HOLDBACK

- .1 Refer to CCDC 2.
- .2 Where legislation permits, if Contract Administrator has certified that Work of subcontractor or supplier has been performed prior to Substantial Performance of Work, Owner shall pay holdback amount retained for such subcontract Work, or products supplied by such supplier, on day following expiration of holdback period for such Work stipulated in lien legislation applicable to Place of Work.
- .3 In addition to provisions of preceding paragraph, and certificate wording, ensure that such Subcontract Work or products is protected pending issuance of Final Certificate for Payment and be responsible for correction of defects or Work not performed regardless of whether or not such was apparent when such certificates were issued.

1.9 FINAL PAYMENT

- .1 Refer to CCDC 2, GC 5.7.
- .2 Submit application for final payment when Work is completed.
- .3 Contract Administrator will, no later than ten (10) days after receipt of application for final payment, review Work to verify validity of application. Contract Administrator will give notification that application is valid or give reasons why it is not valid, no later than seven (7) days after reviewing Work.
- .4 Contract Administrator will issue Final Certificate for Payment when application for final payment is found valid.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Updated 2016-07-11 / Approved: 2010-12-31

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 N/A
- .2 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Contract Administrator are specified under sections as follows:
 - .1 N/A

1.2 APPOINTMENT AND PAYMENT

- .1 Contract Administrator will appoint and pay for services of testing laboratory except follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under supervision of Contract Administrator.
 - .6 Additional tests specified as follows:
 - .1 Material.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with Contract requirements, pay costs for additional tests or inspections as required by Contract Administrator to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
- .2 Notify Contract Administrator forty-eight (48) hour's minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Contract Administrator.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Updated: 2016-07-11 / Approved: 2009-12-31

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 **Section 32 12 16.**

1.2 REFERENCES

- .1 N/A

1.3 ADMINISTRATIVE

- .1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Contract Administrator in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator's review.
- .10 Keep one reviewed copy of each submission on site.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Refer to CCDC 2 GC 3.11.
- .2 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .3 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

- .4 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .5 Allow ten (10) days for the Contract Administrator's review of each submission.
- .6 Adjustments made on shop drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- .7 Make changes in shop drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.
- .8 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.
- .9 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .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.

- .10 After Contract Administrator's review, distribute copies.
- .11 Submit one (1) transparency, electronic copy, 6 prints of shop drawings for each requirement requested in specification Sections and as Contract Administrator may reasonably request.
- .12 Submit six (6) electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Contract Administrator where shop drawings will not be prepared due to standardized manufacture of product.
- .13 Submit six (6) electronic copies of test reports for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within three (3) years of date of contract award for project.
- .14 Submit six (6) electronic copies of certificates for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .15 Submit six (6) electronic copies of manufacturers' instructions for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .16 Submit six (6) electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Contract Administrator.
- .17 Documentation of the testing and verification actions taken by Manufacturer's Representative to confirm compliance with Manufacturer's standards or instructions.
- .18 Submit six (6) electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Contract Administrator.
- .19 Delete information not applicable to project.
- .20 Supplement standard information to provide details applicable to project.
- .21 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, transparency, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .22 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

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

1.5 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Contract Administrator business address.
- .3 Notify Contract Administrator in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- .6 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 MOCK-UPS

- .1 Erect mock-ups in accordance with **Division 01 45 00 - Quality Control**.

1.7 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic and hard copy of colour digital photography in .jpg format, standard resolution, monthly with progress statement, as directed by Contract Administrator.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: four (4) locations.
 - .1 Viewpoints and their location as determined by Contract Administrator.
- .4 Frequency of photographic documentation: monthly or as directed by Contract Administrator.
 - .1 Upon completion of: of Work, as directed by Contract Administrator.

1.8 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Updated: 2016-07-12 / Created 2016-06-23

Part 1 General

1.1 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Materials Safety Data Sheets (MSDS)
- .3 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. [Latest version]

1.2 SUBMITTALS

- .1 Make submittals in accordance with **Section 01 33 00 - Submittal Procedures.**
- .2 Submit site-specific Health and Safety Plan: Within seven (7) days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit two (2) copies of Contractor's authorized representative's work site health and safety inspection reports to the authority having jurisdiction, weekly, Contract Administrator for information and record purposes only.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with **Section 01 47 15 - Sustainable Requirements: Construction** and **Section 02 81 01 - Hazardous Materials.**
- .7 Contract Administrator will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within one (1) day after receipt of plan. Revise plan as appropriate and resubmit plan to Contract Administrator within five (5) days after receipt of comments from Contract Administrator.
- .8 Contract Administrator's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Contract Administrator.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

- .1 See Contractor's Health and Safety Plan.

1.3 FILING OF NOTICE

- .1 File Notice of Project with the Province of Ontario authorities prior to beginning of Work.
- .2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility with three (3) weeks of contract award. Contractor to submit written acknowledgement to CSST along with Ouverture de Chantier Notice.
- .3 Work zone locations include:
 - .1 Cyprus Lake road from Highway #6 westerly, 5.4 km.
- .4 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.4 SAFETY ASSESSMENT

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

1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Contract Administrator prior to commencement of Work.

1.6 GENERAL REQUIREMENTS

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

1.7 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety or property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.8 PROJECT / SITE CONDITIONS

- .1 Work at the site may involve contact with:
 - .1 Poison Ivy
 - .2 Silica (sand & aggregate)
 - .3 Massassauga Rattlesnakes
 - .4 Black Bears

1.9 COMPLIANCE REQUIREMENTS

- .1 Comply with Ontario Health and Safety Act and Regulation for Construction Projects, R.S.O.
- .2 Comply with Occupational Health and Safety Regulations, 1996.
- .3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.10 UNFORSEEN HAZARDS

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

1.11 HEALTH AND SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
 - .1 Have minimum of 3 years' site-related working experience specific to activities associated with this project.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .5 Be on site during execution of Work [and report directly to and be under direction of site supervisor.

1.12 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of the Province of Ontario having jurisdiction, and in consultation with Contract Administrator.

1.13 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Contract Administrator.
- .2 Provide Contract Administrator with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Contract Administrator may stop Work if non-compliance of health and safety regulations is not corrected.

1.14 WORK STOPPAGE

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

END OF SECTION

Updated: 2016-07-11 / Approved: 2012-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 **Section 31 11 00.**

1.2 REFERENCES

.1 Definitions:

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

.2 Reference Standards:

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
 - .2 Rating System Addenda for New Construction and Major Renovations LEED Canada-NC Version 1.0-[Addendum 2007].
 - .3 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
 - .4 LEED Canada 2009 for Design and Construction-[2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide
 - .5 LEED Canada for Existing Buildings, Operations and Maintenance-[2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.
- .2 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-2008 Stipulated Price Contract.
- .3 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005-[92], Storm Water Management for Construction Activities, Chapter 3.
 - .2 EPA General Construction Permit (GCP) [2012].

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Product Data:
 - .1 Submit two (2) copies of WHMIS MSDS in accordance with **Section 01 35 29.06 - Health and Safety Requirements** and **Section 01 35 43 - Environmental** Procedures.
- .3 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with **Section 01 35 21 - LEED Requirements**.
- .4 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Contract Administrator.
- .5 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .6 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .7 Include in Environmental Protection Plan:
 - .1 Name(s) of person(s) responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Name(s) and qualifications of person[s] responsible for manifesting hazardous waste to be removed from site.
 - .3 Name(s) and qualifications of person(s) responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations [and EPA 832/R-92-005, Chapter 3].
 - .6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
 - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
 - .8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
 - .9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 - .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

- .12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .13 Waste Water Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .15 Pesticide treatment plan to be included and updated, as required.

1.4 FIRES

- .1 Fires and burning of rubbish on site is not permitted or permitted only when approved by Contract Administrator.
- .2 Where fires or burning is permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved.
 - .1 Restore, clean and return to new condition stained or damaged work.
- .3 Provide supervision, attendance and fire protection measures as directed.

1.5 DRAINAGE

- .1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 and US EPA General Construction Permit.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties as indicated.
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

- .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated on the plans or directed by Contract Administrator.

1.7 WORK ADJACENT TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Use waterway beds for borrow material only after written receipt of approval from Contract Administrator.
- .3 Waterways to be kept free of excavated fill, waste material and debris.
- .4 Design and construct temporary crossings to minimize erosion to waterways.
- .5 Do not skid logs or construction materials across waterways.
- .6 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .7 Blasting is allowed only above water and 100 m minimum from indicated spawning beds.

1.8 POLLUTION CONTROL

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

1.9 HISTORICAL/ARCHAEOLOGICAL CONTROL

- .1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Contract Administrator.

1.10 NOTIFICATION

- .1 Contract Administrator will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection Plan.

- .2 Contractor: after receipt of such notice, inform Contract Administrator of proposed corrective action and take such action for approval by Contract Administrator.
 - .1 Take action only after receipt of written approval by Contract Administrator.
- .3 Contract Administrator will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 - Cleaning**.
 - .1 Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site where directed after receipt of written approval from Contract Administrator.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .5 Waste Management: separate waste materials for reuse and/or recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Updated: 2016-07-11 - Approved: 2006-09-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16.

1.2 REFERENCES

- .1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-[94], Stipulated Price Contract.

1.3 INSPECTION

- .1 [Refer to CCDC 2, GC 2.3].
.2 Allow Contract Administrator 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 Contract Administrator instructions, or law of Place of Work.
.4 If the 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 Contract Administrator will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents.

1.4 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Contract Administrator for purpose of inspecting and/or testing portions of Work. The Cost of such services will be borne by Contract Administrator.
.2 Allocated costs: to **Section 01 21 00 - Allowances.**
.3 Provide equipment required for executing inspection and testing by appointed agencies.
.4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
.5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract Administrator at no cost to Contract Administrator. Pay costs for retesting and reinspection.

1.5 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.

1.6 PROCEDURES

- .1 Notify appropriate agency and Contract Administrator in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 REJECTED WORK

- .1 [Refer to CCDC, GC 2.4].
- .2 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 Contract Administrator as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .3 Make good other Contractor's work damaged by such removals or replacements promptly.
- .4 If in opinion of Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from the Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Contract Administrator in consultation with other Parks Canada Representatives.

1.8 REPORTS

- .1 Submit four (4) copies of inspection and test reports to Contract Administrator.
- .2 Provide copies to the Subcontractor of Work being inspected or tested.

1.9 TESTS AND MIX DESIGNS

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

1.10 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations as acceptable to Contract Administrator.
- .3 Prepare mock-ups for Contract Administrator review with reasonable promptness and in orderly sequence, to not cause delays in Work.

- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Contract Administrator will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Contract Administrator.
- .7 Mock-ups may remain as part of Work.
- .8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.11 MILL TESTS

- .1 Submit mill test certificates as [requested].

1.12 EQUIPMENT AND SYSTEMS

- .1 Non-applicable

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Updated: 2016-07-11 / Approved: 2006-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29.6

1.2 REFERENCES

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-[1994], Stipulated Price Contract.
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
 - .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.
 - .2 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-0121-[M1978(R2003)], Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-[M1987(R2003)], Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-[96(R2001)], Signs and Symbols for the Occupational Environment.
- .5 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.
- .6 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with **Section 01 33 00 - Submittal Procedures**.
- .2 LEED Submittals:
 - .1 Submit erosion and sedimentation control plan for Credit SSp1 in accordance with LEED Canada-NC.

1.4 INSTALLATION AND REMOVAL

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

1.5 SCAFFOLDING

- .1 N/A

1.6 HOISTING

- .1 N/A

1.7 ELEVATORS (NOT APPLICABLE)

- .1 N/A

1.8 SITE STORAGE/LOADING

- .1 Refer to CCDC 2, GC 3.12.
- .2 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .3 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.9 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Clean runways and taxi areas where used by Contractor's equipment.

1.10 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.11 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

- .1 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.

1.12 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.13 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 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures. Permanent facilities may be used on approval of Contract Administrator.

1.14 CONSTRUCTION SIGNAGE

- .1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Contract Administrator.
- .2 Construction sign 1.2 m x 1.8 m, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.
- .3 Indicate on sign, name of the Owner, and the Contractor and the Subcontractor, of design style established by Contract Administrator.
- .4 No other signs or advertisements, other than warning signs, are permitted on site.
- .5 Provide project identification site sign comprising foundation, framing, and one 1200 x 2400 mm signboard as detailed and as described below.
 - .1 Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.
 - .2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
 - .3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
 - .4 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
 - .5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
 - .6 Vinyl sign face: printed project identification, self-adhesive, vinyl film overlay, supplied by Contract Administrator.
- .6 Locate project identification sign as directed by Contract Administrator and construct as follows:
 - .1 Build concrete foundation, erect framework, and attach signboard to framing.

- .2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
- .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .7 Direct requests for approval to erect Consultant/Contractor signboard to Contract Administrator. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.
- .8 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .9 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Contract Administrator.

1.15 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Contract Administrator.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Construct access and haul roads necessary.
- .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .10 Dust control: adequate to ensure safe operation at all times.
- .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Contract Administrator.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Provide snow removal during period of Work.
- .14 Remove, upon completion of work, haul roads designated by Contract Administrator.

1.16 CLEAN-UP

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

- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, 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.

END OF SECTION

Updated: 2016-07-11 / Approved: 2006-03-31

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 **Section 01 52 00** and **section 01 35 29.6**

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-O121-[M1978(R2003)], Douglas Fir Plywood.
- .3 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.3 INSTALLATION AND REMOVAL

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

1.4 HOARDING

- .1 Non-applicable

1.5 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs, and other hazardous areas.
- .2 Provide as required by governing authorities.

1.6 WEATHER ENCLOSURES (NOT APPLICABLE)

- .1 Non-applicable.

1.7 DUST TIGHT SCREENS

- .1 N/A

1.8 ACCESS TO SITE

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

1.9 PUBLIC TRAFFIC FLOW

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

1.10 FIRE ROUTES

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

1.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.12 PROTECTION OF BUILDING FINISHES

- .1 N/A

1.13 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Updated: 2016/07/11 - Approved: 2006-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 N/A

1.2 REFERENCES

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-[94], Stipulated Price Contract.
- .2 Owner's identification of existing survey control points and property limits.

1.3 QUALIFICATIONS OF SURVEYOR

- .1 Contractor to retain qualified surveyor with GPS survey equipment to layout all road construction, set grades and establish additional benchmarks and control points.
- .2 Such qualified surveyor to be preapproved by the Owner and Engineer prior to starting work.
- .3 Costs for such surveyor to be included in the Contractor's lump sum prices.

1.4 SURVEY REFERENCE POINTS

- .1 Existing paved road is the horizontal and vertical control for recapitalization (reconstruction).
- .2 The Surveyor / layout professional will establish and maintain reference points to control alignment and grades for the work.
- .3 Make no changes or relocations without prior written notice to Contract Administrator.
- .4 Report to Contract Administrator when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require Surveyor to replace control points in accordance with original survey control.

1.5 SURVEY REQUIREMENTS

- .1 Establish additional, numerous bench marks as required for length of road project, in addition to benchmark shown on contract drawings. Record locations of all benchmarks with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, fill placement and landscaping features.
- .4 Stake slopes and berms.
- .5 Establish pipe invert elevations.
- .6 Stake batter boards.

1.6 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Contract Administrator of findings.

1.7 LOCATION OF EQUIPMENT AND FIXTURES

- .1 N/A

1.8 RECORDS

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

1.9 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to Contract Administrator.
- .2 On request of Contract Administrator, submit documentation to verify accuracy of field engineering work.

1.10 SUBSURFACE CONDITIONS

- .1 Promptly notify Contract Administrator in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should Contract Administrator determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Updated: 2016-07-12 - Approved: 2009-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 29 00

1.2 REFERENCES

- .1 Canadian Environmental Protection Act (CEPA)
- .1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
- .1 Convene meeting one (1) week prior to contract completion with the Contractor's Representative and Contract Administrator, in accordance with **Section 01 31 19 - Project Meetings** to:
- .1 Verify Project requirements.
- .2 Review Contract Administrator's installation instructions.
- .2 Contract Administrator to establish communication procedures for:
- .1 Notifying construction warranty defects.
- .2 Determine priorities for type of defects.
- .3 Determine reasonable response time.
- .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
- .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with **Section 01 33 00 - Submittal Procedures**.
- .2 Provide evidence, if requested, for type, source and quality of products supplied.

1.5 FORMAT

- .1 Non-applicable.

1.6 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
- .1 Date of submission.
- .2 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

- .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of Subcontractors and Suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

1.7 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Contract Administrator one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Contract Administrator.

1.8 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Contract Administrator.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Field changes of dimension and detail.
 - .2 Changes made by change orders.

- .3 Details not on original Contract Drawings.
- .4 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and Change Orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records and required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.
- 1.9 FINAL SURVEY**
 - .1 N/A
- 1.10 EQUIPMENT AND SYSTEMS**
 - .1 N/A
- 1.11 MATERIALS AND FINISHES**
 - .1 N/A
- 1.12 MAINTENANCE MATERIALS**
 - .1 Spare Parts:
 - .1 N/A
 - .2 Extra Stock Materials:
 - .1 N/A
 - .3 Special Tools:
 - .1 N/A
- 1.13 DELIVERY, STORAGE AND HANDLING**
 - .1 N/A
- 1.14 WARRANTIES AND BONDS**
 - .1 N/A
- 1.15 WARRANTY TAGS**
 - .1 N/A
- 1.16 NOT USED**
 - .1 Not Used.

Part 2 Execution

2.1 NOT USED

.1 Not Used.

END OF SECTION

Updated: 2016-07-12 / Approved: 2011-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 22 16.13

1.2 MEASUREMENT AND PAYMENT

- .1 Pulverization of existing surface treatment will be included in the Lump Sum Contract Price regardless of depth pulverized or number of operations required.
- .2 This item will include operations involved in pulverizing, grinding and incorporating the pulverized material into the granular base.

1.3 REFERENCES

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
- .2 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Sustainable Design Submittals:
 - .1 LEED Canada-[NC Version 1.0] Submittals: in accordance with **Section 01 35 21 - LEED Requirements.**
 - .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with EPA 832/R-92-2005 authorities having jurisdiction **Section 01 35 21 - LEED Requirements.**
 - .3 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50 % of construction wastes were recycled or salvaged.

Part 2 Products

2.1 EQUIPMENT

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

Part 3 Execution

3.1 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Prior to beginning removal operation, inspect and verify with Contract Administrator areas, depths and lines of asphalt pavement to be removed.
- .3 Protection: protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Contract Administrator at no additional cost.

3.2 REMOVAL

- .1 Remove existing asphalt pavement to lines and grades established by Contract Administrator in field.
- .2 Use equipment and methods of removal and integration with the existing granular base which does not damage underlying base.
- .3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.
- .4 Suppress dust generated by removal process.
- .5 Pulverize to a depth of 100 mm.

3.3 FINISH TOLERANCES

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

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 - Cleaning**.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .3 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.
- .4 Waste Management: separate waste materials for reuse and/or recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.

- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .2 Removed asphalt pavement which is to be recycled in hot mix asphalt concrete under this contract may be stockpiled at designated asphalt plant site.

END OF SECTION

Updated: 2016/07/15 - Approved: 2011-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 See this specification.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 Measurement and Payment:
 - .1 Measurement Procedures: in accordance with **Section 01 29 00 - Payment Procedures**.
 - .2 All concrete paid on a lump sum basis.

1.3 REFERENCES

- .1 Abbreviations and Acronyms:
 - .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
 - .1 Type GU, GUb and GUL - General use cement.
 - .2 Type MS and MSb - Moderate sulphate-resistant cement.
 - .3 Type MH, MHb and MHL - Moderate heat of hydration cement.
 - .4 Type HE, HEb and HEL - High early-strength cement.
 - .5 Type LH, LHb and LHL - Low heat of hydration cement.
 - .6 Type HS and HSb - High sulphate-resistant cement.
 - .2 Fly ash:
 - .1 Type F - with CaO content less than 15%.
 - .2 Type CI - with CaO content ranging from 15 to 20%.
 - .3 Type CH - with CaO greater than 20%.
 - .3 GGBFS - Ground, granulated blast-furnace slag.
- .2 Reference Standards:
 - .1 ASTM International
 - .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C1017/C1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .5 ASTM D412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

- .6 ASTM D624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .7 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .8 ASTM D1752-04a(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 Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
 - .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .4 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).

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 N/A

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with **Section 01 33 00 - Submittal Procedures**.
- .2 At least two (2) weeks prior to beginning Work, provide Contract Administrator with samples of materials proposed for use as follows:
 - .1 Concrete design mix.
 - .2 2 m length of each type of joint filler.
- .3 Provide testing results for review by Contract Administrator and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with **Section 01 45 00 - Quality Control**.
- .2 Provide Contract Administrator, minimum two (2) weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .3 Minimum two (2) weeks prior to starting concrete work, provide proposed quality control procedures for review by Contract Administrator 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 Contract Administrator verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.7 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Contract Administrator and provide verification of compliance as described in PART 1.6 - QUALITY ASSURANCE.

2.2 MATERIALS

- .1 Portland Cement: to CSA A3001, Type GU.

- .2 Supplementary cementing materials: with minimum 20 % Type F fly ash replacement, by mass of total cementitious materials to CSA A3001.
- .3 Water: CSA A23.1.
- .4 Aggregates: CSA A23.1/A23.2.
- .5 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to ASTM C494 and ASTM C1017. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .6 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 35 MPa at twenty-eight (28) days.
- .7 Curing compound: to CSA A23.1/A23.2 white ASTM C309.
- .8 Mechanical waterstops: ribbed extruded PVC Arctic Grade of sizes indicated with shop welded corner and intersecting pieces with legs not less than 500 mm long:
 - .1 Tensile strength: to ASTM D412, method A, Die "C", minimum 11.4 MPa.
 - .2 Elongation: to ASTM D412, method A, Die "C", minimum 275 %.
 - .3 Tear resistance: to ASTM D624, method A, Die "B", minimum 48 kN/m.
- .9 Premoulded joint fillers (expansion joints)
 - .1 Bituminous impregnated fiber board: to ASTM D1751. Also to OPSS 351.05.02.
 - .2 Install expansion joints against each side of eco structures for full depth of concrete pours.

2.3 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Contract Administrator 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 Submit concrete mix for approval.
 - .1 Workability: free of surface blemishes, loss of mortar, color variations and segregation.
 - .3 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: C-2.
 - .2 Compressive strength at 28th day: 35 Mpa.
 - .3 Air entrainment: 6% to 8%.
 - .4 Intended application - Exposed.
 - .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.

2.4 PREPARATION

- .1 Obtain Contract Administrator written approval before placing concrete.
 - .1 Provide twenty-four (24) hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing (welded wire mesh) at centre of pours for entire area of pours.
- .3 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete is permitted only after approval of equipment and mix.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Contract Administrator approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
 - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .11 Do not place load upon new concrete until authorized by Contract Administrator.

2.5 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 Contract Administrator.
 - .2 Where approved by Contract Administrative 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 Contract Administrative.
 - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Contract Administrative 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 Contract Administrative.
 - .1 Formed holes: 100 mm minimum diameter.
 - .2 Drilled holes: to manufacturers' recommendations 25 mm minimum diameter larger than bolts used.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with 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 Form weep holes and drainage holes in accordance with **Section 03 10 00 - Concrete Forming and Accessories**. If wood forms are used, remove them after concrete has set. **NOTE:** N/A for this contract.
 - .2 Install weep hole tubes and drains as indicated.
- .5 Dovetail anchor slots: in accordance with **Section 04 05 00 - Common Work Results for Masonry**. **NOTE:** N/A for this contract.
 - .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
 - .2 Install continuous vertical anchor slots at 800 mm on centre where concrete walls are masonry faced.
- .6 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .7 **Finishing and curing:**
 - .1 Finish concrete to CSA A23.1/A23.2.
 - .2 After placement, provide broom finish in direction perpendicular to vehicle travel.

2.6 FIELD QUALITY CONTROL

- .1 Site tests: conduct tests as follows in accordance with **Section 01 45 00- Quality Control** and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .1 Concrete pours.
 - .2 Slump.
 - .3 Air content.
 - .4 Compressive strength at seven (7) and twenty-eight (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 Contract Administrator 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 Contract Administrator.
- .4 Contractor will pay for costs of tests as specified in **Section 01 29 83 - Payment Procedures for Testing Laboratory Services.**
- .5 Contract Administrator may 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 Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

END OF SECTION

Updated: 2016-07-11 / Approved: 2010-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Sections 01 33 00, Section 03 30 00 and Section 05 50 00

1.2 PRICE AND PAYMENT PROCEDURES

- .1 Measurement and Payment:

- .1 This is a Lump Sum Contract. The cost of all traffic signage is to be included in the Lump Sum Bid.

1.3 REFERENCES

- .1 American Association of State Highway and Transportation Officials (AASHTO)
- .1 Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, (5th Edition).
- .2 ASTM International
- .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A276-10, Standard Specification for Stainless Steel Bars and Shapes.
- .3 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
- .4 ASTM B210M-05, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes Metric.
- .5 ASTM B211M-03, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire Metric.
- .3 Canadian General Standards Board (CGSB)
- .1 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.
- .4 CSA International
- .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA O80 Series-08, Wood Preservation.
- .3 CSA O121-08, Douglas Fir Plywood.
- .4 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
- .5 CAN/CSA-Z809-08, Sustainable Forest Management.
- .5 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .6 Green Seal Environmental Standards (GS)

- .1 GS-11-11, Paints and Coatings.
- .7 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.
- .8 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with **Section 01 33 00 - Submittal Procedures.**
- .2 Product Data:
 - .1 Submit Manufacturer's instructions, printed product literature and data sheets for traffic signage, including product characteristics, performance criteria, physical size, finish and limitations.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with Manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, in dry location and in accordance with Manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Develop a Construction Waste Management Plan related to Work of this Section and in accordance with **Section 01 35 21 - LEED Requirements.**
- .5 Packaging Waste Management: remove for reuse by Manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements.**

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Sign supports to be capable of withstanding the combination of following loads:
 - .1 Wind loads in any direction of 0.60 kPa on signboards and 0.60 kPa on sign supports.
 - .2 Dead load of signboards and sign supports.
 - .3 Ice load of 0.25 kPa on face of signboards and around surface of structural members.

- .2 Structural deflections and vibration in accordance with American Association of State Highway and Transportation Officials (AASHTO), "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals".

2.2 MATERIALS

- .1 Sign supports:
- .1 Steel posts: to CSA G40.21, 4 m long, flanged "U" shaped in cross section, measuring 65 mm wide x 30 mm deep. Metal thickness: 4.5 mm. Hot dipped galvanized: to ASTM A123/A123M, minimum zinc coating 550 g/m².
 - .2 Standard tubular supports for small signs: to ASTM B210M.
 - .3 Timber posts:
 - .1 Sawn timber posts:
 - Species: White Cedar.
 - Type: Natural, Not Painted.
 - Grade: No 1.
 - Dimensions: 100 mm X 100 mm yai less otherwise note
 - CAN/CSA-Z809 or FSC or SFI certified.
 - .2 Posts to be treated in accordance with CAN/CSA O80 Series.
 - .4 Vertical tubular supports and connecting diagonal members: to ASTM B210M.
 - .5 Truss members: to ASTM B210M.
 - .6 Aluminum tubular members: belt ground satin finish.
 - .7 Base plates for ground mounted signs: to ASTM B209M.
 - .8 Tubular support caps for ground mounted signs: to ASTM B210M or fabricated from aluminum plate as specified in ASTM B209M.
 - .9 Aluminum flanges: to ASTM B211M.
 - .10 Anchor and connecting bolts, 'U' clamps and miscellaneous hardware for overhead sign installations: fabricate from 304 stainless steel as specified in ASTM A276.
 - .11 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.
- .2 Signboards:
- .1 Aluminum sheet: to ASTM B209M, precut to required dimensions.
 - .1 Thickness for signboards up to 750 mm wide: 1.6 mm minimum.
 - .2 Thickness for signboards 750-1200 mm wide: 2.1 mm minimum.
 - .3 Thickness for refurbishing existing sign panels: 1.0 mm minimum.
 - .2 Aluminum extrusions: to ASTM B211M, 150 mm or 300 mm panels suitable for bolting together.
 - .3 T-shape stiffeners for signboards: to ASTM B210M.
 - .4 Connecting straps and brackets: to ASTM B209M.
 - .5 Aluminum materials: to ASTM B209M.
 - .6 CAN/CGSB-1.94

- .7 Chemical conversion coating for aluminum: CGSB 31-6 P101 ma
- .8 Primer for aluminum: to MPI # 8 VOC limit of 250 GS-11.
- .9 Silk screen ink:
 - .1 Transparent or opaque colours: selected by Contract Administrator or as indicated.
- .10 Reflective sheeting and tape: to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.
- .11 Transparent tape: flexible, smooth-surfaced, moisture resistant tape with pressure sensitive adhesive.
- .12 Clear varnish protective coat: MPI-EXT 6.4H VOC limit of 350 SCAQMD Rule 1113.
- .13 List of required signs to be supplied by the Contractor are:
 - .1 Stop Sign:
 - MTO #Ra-1 – 60 X 60 cm
 - Sign to be bilingual (Displays ‘Stop’ & ‘Arrest’)
 - Font: Highway Gothic C
 - Colour: Legend & Border – White Reflective
 - Background – Red Reflective
 - .2 Stop Ahead:
 - MTO # Wb-1 – 75 X 75 cm
 - Colour: Stop Symbol – Red Reflective
 - Legend & Border – Black
 - Background – Yellow Reflective
 - Made of 2MM rustproof aluminium, engineer grade reflective, 150 m visibility
 - .3 25km/Hr. Speed Sign (Rb-1a)
 - MTO # Rb-1a – 60 X 75 cm
 - Colour: Legend & Border – Black
 - Background – White Reflective
 - Made of 2MM rustproof aluminium, engineer grade reflective, 150 m visibility
 - .4 40 km/h Speed Sign (Rb-2a)
 - MTO #Rb-1a – 60 cm X 90 cm
 - Font: Highway Gothic C, D
 - Colour: Top Section of Sign:
 - .1 Legend and Border – Black
 - .2 Background – White Reflective
 - Colour: Bottom Section of Sign:
 - .1 Legend – White Reflective
 - .2 Background – Black

- .5 No Parking Sign (Rb-5i)
 - MTO #Rb-5i – 30 cm X 30 cm
 - Font: N/A
 - Colour: Interdictory Symbol – Red Reflective
 - .1 Legend & Border: Black
 - .2 Background: White Reflective

- .6 Bike Lane Sign (Wc – 19)
 - MTO #Wc – 19 – 60 cm X 60 cm
 - Font: N/A
 - Colour: Interdictory Symbol – Black
 - .1 Legend & Border: Black
 - .2 Background: Yellow Reflective

2.3 FABRICATION

- .1 Supports:
 - .1 Connect aluminum support members by welding in accordance with CSA W47.2. Work to be performed by Canadian Welding Bureau qualified members only. Flame cutting of members not permitted.
 - .2 Welds to be of same strength as adjacent member or casting.
 - .3 Reinforce in area of electrical hand holes to equal strength of full section member.
 - .4 Remove sharp edges and burrs.
- .2 Signboards:
 - .1 Aluminum blanks:
 - .1 Degrease, etch and bonderize with chemical conversion coating.
 - .2 Clean surfaces with xylene thinner. Dry.
 - .3 For non-reflective signs, spray face with one coat vinyl pre-treatment coating and two finish coats of required colour.
 - .4 For aluminum signboards that are to be painted before installation, spray and bake face of signboards with two coats of enamel in accordance with MPI-EXT 5.4 A.
 - .2 Reflective background sheeting and lettering:
 - .1 Cut and apply in accordance with Manufacturer's instructions.
 - .2 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.
 - .3 Edge wrap sheeting on each extrusion prior to bolting extrusions. Match pieces of sheeting from different rolls for each signboard to ensure uniform appearance and brilliance by day and night.

- .4 Reflective signboard faces may be prepared using silk screen transparent ink.
- .3 Non-reflective lettering and symbols: cut from vinyl film as specified in CGSB 62-GP-9M, or paint using required colour of finish paint [maximum VOC of [350] [250] [SCAQMD Rule 1113] [GS-11]] or silk screen transparent ink.
- .4 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.
- .5 Apply two coats of white paint with maximum VOC content of 50 to GS-11 to wooden sign posts. Allow initial coat to dry before applying second coat. Apply paint only when relative humidity is below 85% and ambient temperature is above 5 degrees C.
- .3 Sign identification:
 - .1 Apply sign number and date of installation with 25 mm high stencil painted black letters on lower left back face of each signboard.

Part 3 Execution

3.1 INSTALLATION

- .1 Sign bridge:
 - .1 Erect sign bridge as indicated. Permissible tolerance: 12 mm maximum departure from vertical.
- .2 Sign support:
 - .1 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.
 - .2 Coat underside of base plate with corrosion protective paint before installation. Connect shoe base to shaft with inside and outside fillet welds.
 - .3 Close open aluminum tubes and posts with aluminum cap. Cut oblong holes in shoe bases to drain condensation. Install aluminum bolt cover on each base plate restraining nut.
 - .4 Erect posts plumb and square to details as indicated.
 - .5 Join truss sections with wrought aluminum flanges welded to chords with inside and outside fillet welds. Build in camber to truss and monotube bridge supports to allow for deflection due to dead load of sign support, signboards, appurtenances; and an additional 1:300 camber.
- .3 Signboard:
 - .1 Fasten signboard(s) to supporting posts and brackets as indicated.
 - .2 Use T-shape aluminum stiffeners to join portions of sign panel on site. Cover face of T-stiffener with material identical to face of sign panel.

3.2 CORRECTING DEFECTS

- .1 Correct defects, identified by Contract Administrators, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard and adjust luminaire aiming angle for optimum performance during night conditions to approval of Contract Administrator.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 - Cleaning**.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .3 Waste Management: separate waste materials for recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.
 - .1 Carefully dismantle and salvage wood, aluminum and steel materials for reuse and/or recycling.
 - .2 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .3 Contractor to dispose of all salvaged material.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END OF SECTION

Updated: 2016-07-12 / Approved: 2006-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 **Section 3100 0001 and Section 31.14.13.**

1.2 MEASUREMENT PROCEDURES

- .1 This is a lump sum contract. The cost of clearing, grubbing, close-cut clearing, underbrush clearing and trimming is to be included.

1.3 REFERENCES

- .1 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.

1.4 DEFINITIONS

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
- .4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, [and trees smaller than 50 mm trunk diameter] and disposing of fallen timber and surface debris.
- .5 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with **Section 01 33 00 - Submittal Procedures.**
- .2 Samples:
 - .1 Submit three (3) samples of each material listed below for approval prior to delivery of materials to project site.
 - .2 Tree wound paint: one liter can with Manufacturer's label.
 - .3 Herbicide: one liter can with Manufacturer's label.
- .3 Submit certificates signed by Manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Submit Manufacturer's installation instructions.

1.6 QUALITY ASSURANCE

- .1 Do construction occupational health and safety in accordance with **Section 01 35 29.06 - Health and Safety Requirements.**
- .2 Safety Requirements: worker protection.
 - .1 Workers must wear gloves, respirators, dust masks, long sleeved clothing, eye protection and protective clothing when applying herbicide materials.
 - .2 Workers must not eat, drink or smoke while applying herbicide material.
 - .3 Clean up spills of preservative materials immediately with absorbent material and safely discard to landfill.

1.7 STORAGE AND PROTECTION

- .1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, site appurtenances, water courses and root systems of trees which are to remain.
 - .1 Repair damaged items to approval of Contract Administrator.
 - .2 Replace trees designated to remain, if damaged, as directed by Contract Administrator.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and/or recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal.**
- .2 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as saleable timber.
 - .1 Trim limbs and tops, and saw into saleable lengths of 2.4 m for saw logs, and 1.2 m for fuel wood.
 - .2 Stockpile adjacent to site.

Part 2 Products

2.1 MATERIALS

- .1 Bituminous based paint of standard manufacture specially formulated for tree wounds.
- .2 Soil Material for Fill:
 - .1 No excavated soil material will be suitable for fill.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, sediment and erosion control drawings, sediment and erosion control plan, 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.

3.2 PREPARATION

- .1 Inspect site and verify with Contract Administrator items designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
 - .1 Notify Contract Administrator immediately of damage to or when unknown existing utility lines are encountered.
- .3 Notify utility authorities before starting clearing and grubbing.
- .4 Keep roads and walks free of dirt and debris.

3.3 APPLICATION

- .1 Manufacturer's instructions: comply with Manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.4 CLEARING

- .1 Clearing includes felling, trimming, cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush and rubbish occurring within cleared areas.
- .2 **Do not clear, trim or cut any trees specifically marked by Parks Canada as to be saved.**
- .3 Clear as directed by Contract Administrator, by cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.
- .4 Cut off branches and cut down trees overhanging area cleared as directed by Contract Administrator.
- .5 Cut off unsound branches on trees designated to remain as directed by Contract Administrator.
- .6 Apply herbicide in accordance with Manufacturer's label to top surface of stumps designated not to be removed.

3.5 CLOSE CUT CLEARING

- .1 Close cut clearing to ground level.
- .2 Perform close cut clearing by hand so that existing muskeg is not damaged.

- .3 Cut off branches, down trees overhanging area cleared as directed by Contract Administrator.
- .4 Cut off unsound branches on trees designated to remain as directed by Contract Administrator.
- .5 Close cut clearing will apply to all trees with caliper 50 mm or greater.

3.6 ISOLATED TREES

- .1 Cut off isolated trees as directed by Contract Administrator at height of not more than 300 mm above ground surface.
- .2 Grub out isolated tree stumps.
- .3 Prune individual trees as indicated.
- .4 Trim trees designated to be left standing within cleared areas of dead branches 4 cm or more in diameter; and trim branches to heights as indicated.
- .5 Cut limbs and branches to be trimmed close to bole of tree or main branches.
- .6 Paint cuts more than 3 cm in diameter with approved tree wound paint.
- .7 Do not grub out stumps or roots that will negatively impact the existing road bed.

3.7 UNDERBRUSH CLEARING

- .1 Clear underbrush from areas as indicated at ground level.

3.8 GRUBBING

- .1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 200 mm below ground surface. Only to the extent that it does not impact the existing road bed.
- .3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m³.
- .4 Fill depressions made by grubbing with suitable material and to make new surface conform to existing adjacent surface of ground.

3.9 REMOVAL AND DISPOSAL

- .1 Remove cleared grubbed materials off site to disposal area as designated by Contract Administrator. Disposal area to be supplied by Contractor.
- .2 Remove diseased trees identified by Contract Administrator and dispose of this material to approval of Contract Administrator.

3.10 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for immediate grading operations, stripping of topsoil to approval of Contract Administrator

3.11 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

Updated: 2016-07-12 / Approved: 2010-12-31

Part 1 General

1.1 REFERENCES

- .1 ASTM International
 - .1 ASTM D698-[07e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600kN-m/m³).

1.2 PROTECTION

- .1 Protect existing trees, landscaping, natural features, buildings, pavement, surface or underground utility lines which are to remain. If damaged, restore to original condition unless directed otherwise.
- .2 Maintain access roads to prevent accumulation of mud on roads.

Part 2 Products

2.1 MATERIALS

- .1 Refer to Section 32 10 01 for Granular Base and Section 32 91 19.13 for Top Soil Placement and Grading.
- .2 Provide Granular A fill as required to provide safe side slopes.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

- .1 Verification of Conditions:
 - .1 Do not handle topsoil while on wet or frozen condition or in any manner in which soil structure is adversely affected.
 - .2 Commence topsoil stripping after area has been cleared and grubbed and debris removed from site
 - .1 Strip all areas of excavation and construction as directed by Contract Administrator.
 - .3 Strip topsoil to depths shown on the drawings or as directed by Contract Administrator. Avoid mixing topsoil with subsoil.
 - .4 Dispose of unused topsoil as directed by the Departmental Representative (Parks Canada).
 - .5 Protect stockpiles from contamination and compaction.

3.2 SITE PREPARATION

- .1 Store removed material in location on Site as determined by the Contract Administrative and as noted in **Section 01 74 11 – Cleaning**.

- .2 Strip lot base material to depth of native founding material. Avoid mixing granular base material with native soil to remain.
- .3 Dispose of unused topsoil as directed by the Contract Administrator off site.
- .4 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure as adversely affected as determined by the Contract Administrator.

3.3 GRADING

- .1 Rough grade to levels, profiles and contours allowing for surface treatment as indicated.
- .2 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximatively same moisture content to facilitate bonding.
- .3 Compact filled and disturbed areas to Standard Proctor Density to ASTM D698, as follows:
 - .1 90% under boulevard.
 - .2 98% under paved areas, shoulders and trail.

3.4 TESTING

- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC.
- .2 Costs of tests will be paid by the Contract Administrator.

3.5 SURPLUS MATERTIAL

- .1 Remove surplus material and material unsuitable for fill, grading or landscaping off site as directed by the Contract Administrator.

END OF SECTION

Updated: 2016-07-12 / Approved: 2012-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Non applicable.

1.2 MEASUREMENT PROCEDURES

- .1 This is a lump sum contract. There will be no measurement for payment.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM D698-07e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³) 600 kN-m/m³.
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum 2007).
 - .2 LEED Canada-NC-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.
 - .3 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
 - .4 LEED Canada-EB: O M-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with **Section 01 33 00 - Submittal Procedures.**
- .2 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with **Section 01 35 21 - LEED Requirements.**
 - .2 Construction Waste Management:
 - .1 Submit project a Waste Management Plan and a Waste Reduction Workplan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50 % of construction wastes were recycled or salvaged.
 - .3 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction **Section 01 35 21 - LEED Requirements.**

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for roadway subgrade reshaping installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Contract Administrator.
 - .2 Inform the Contract Administrative 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 Contract Administrator.

3.2 SCARIFYING AND RESHAPING

- .1 Scarify subgrade to full width as directed by Contract Administrator and to depth of 100 mm minimum.
- .2 Pulverize and break down scarified material to 30 mm maximum soil clod size, except that stones larger than this size may be left intact as directed by Contract Administrator.
- .3 Blade and trim pulverized material to elevation and cross section dimensions as directed by Contract Administrator.
- .4 Where deficiency of material exists, add and blend additional subgrade material as directed by Contract Administrator.
- .5 Waste excess material and/or re-use excess material in areas of material deficiency, blade excess material over shoulder and trim, as directed by Contract Administrator.

3.3 COMPACTING

- .1 Compact to minimum corrected maximum dry density, maximum dry density to ASTM D698.
- .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 value not greater than 2 % moisture above optimum value for compaction to ASTM D698.

3.4 SITE TOLERANCES

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

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 - Cleaning**.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .3 Waste Management: separate waste materials for reuse and/or recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 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 the Contract Administrative acceptance.

END OF SECTION

Updated: 2016-07-12 / Approved: 2009-12-31

Part 1 General

1.1 PRICE AND PAYMENT PROCEDURES

.1 Allowances:

- .1 This is a Lump Sum Contract. There will be no separate or additional payment for rock. It is anticipated that only the placing of culverts or eco-structures might require rock excavation.

.2 Definitions:

- .1 Rock: any solid material in excess of 0.25 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
- .2 PPV: peak particle velocity.

.3 Reference Standards:

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
 - .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Blasting will not be permitted on the Contract. If rock is encountered above the bottom of beading grade at any culvert or eco-structure location it will be shattered for removal by the use of drills, rock chisels, large excavators or a combination of these methods excluding blasting.

.3 Sustainable Standards Certification:

- .1 Construction Waste Management: submit copy of Waste Management Plan for project highlighting recycling and salvage requirements
- .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50 % of construction wastes were recycled or salvaged.
- .3 Erosion and Sedimentation Control: submit copy of Erosion and Sedimentation Control Plan for project highlighting implementation measures.

.4 Qualification Statements:

- .1 Retain licensed explosives expert to program and supervise blasting work, to interpret recommendations of pre-blasting report, and to determine precautions, preparation and operations techniques.

- .2 Submit documentation verifying explosives expert's qualifications.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with **Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.**
- .2 Packaging Waste Management: remove for reuse and return to Manufacturer] of packaging materials in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal.**
- .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 in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements 01 78 00 - Closeout Submittals.**

Part 2 Products

2.1 MATERIALS

- .1 Not used.

Part 3 Execution

3.1 ROCK REMOVAL: Required only for road crossing culverts or ECO structures.

- .1 Perform excavation in accordance with Erosion and Sedimentation Control Plan **Section 01 35 21 - LEED Requirements.**
- .2 Co-ordinate this Section with **Section 01 35 29.06 - Health and Safety Requirements.**
- .3 Remove rock to alignments, profiles, and cross sections as indicated.
- .4 Explosive blasting is not permitted.
- .5 Excavate rock to horizontal surfaces with slope not to exceed one to one.
- .6 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.
- .7 Excavate trenches to lines and grades to minimum of 150 mm below pipe invert indicated. Provide recesses for bell and spigot pipe to ensure bearing will occur uniformly along barrel of pipe.
- .8 Cut trenches to widths as indicated.
- .9 Remove boulders and fragments which may slide or roll into excavated areas.
- .10 Correct unauthorized rock removal at no extra cost, in accordance with **Section 31 23 33.01 - Excavating, Trenching and Backfilling.**

3.2 CLEANING

- .1 Clean in accordance with **Section 01 74 11 - Cleaning.**
- .2 Rock Disposal:
 - .1 Dispose of surplus off site in accordance with **Section 01 74 21 - Construction/demolition Waste Management and Disposal.**
 - .2 Do not dispose removed rock into landfill. Send material to appropriate quarry as approved by Contract Administrator.
- .3 Waste Management: separate waste materials for reuse and/or recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements.**

END OF SECTION

Created: 2016-08-07

Part 1 General

1.1 DESCRIPTION

- .1 This section specifies performance of dewatering required to lower and control ground water table levels and hydrostatic pressures to permit excavation, backfill, and construction to be performed in the dry. Control of surface water shall be considered as part of the work under this specification.

1.2 REQUIREMENT

- .1 The dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation at least 300 mm below the lowest subgrade or bottom of pipe trench and to allow material to be excavated, piles to be driven, and concrete placed, in a reasonably dry condition. Materials to be removed shall be sufficiently dry to permit excavation to grades shown and to stabilize excavation slopes where sheeting is not required. Operate dewatering system continuously until backfill work has been completed.
- .2 Reduce hydrostatic head below any excavation to the extent that water level in the construction area is a minimum of 300 mm below prevailing excavation surface.
- .3 Prevent loss of fines, seepage, boils, quick conditions or softening of foundation strata.
- .4 Maintain stability of sides and bottom of excavation.
- .5 Construction operations are performed in the dry.
- .6 Control of surface and subsurface water is part of dewatering requirements. Maintain adequate control so that:
 - .1 The stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.
 - .2 Erosion is controlled.
 - .3 Flooding of excavations or damage to structures does not occur.
 - .4 Surface water drains away from excavations.
 - .5 Excavations are protected from becoming wet from surface water, or insure excavations are dry before additional work is undertaken.
- .7 Permitting Requirements: The Contractor shall comply with and obtain the required permits where the work is performed.

1.3 SUBMITTALS

- .1 Submit drawings and data showing the method to be employed in dewatering excavated areas thirty (30) days before commencement of excavation.
- .2 Material shall include: location, depth and size of wellpoints, headers, sumps, ditches, size and location of discharge lines, capacities of pumps and standby units and detailed

- description of dewatering methods to be employed to convey the water from site to adequate disposal.
- .3 Include a written report outlining control procedures to be adopted if dewatering problem arises.
 - .4 Capacities of pumps, prime movers, and standby equipment.
 - .5 Design calculations proving adequacy of system and selected equipment. The dewatering system shall be designed using accepted and professional methods of design and engineering consistent with the best modern practice. The dewatering system shall include the deep wells, wellpoints, and other equipment, appurtenances, and related earthwork necessary to perform the function.
 - .6 Detailed description of dewatering procedure and maintenance method.
 - .7 Materials submitted shall be in a format acceptable for inclusion in required permit applications to any and all regulatory agencies for which permits for discharge water from the dewatering system are required due to the discharge reaching regulated bodies of water.
 - .8 All required permits.

Part 2 Products (Not Applicable)

Part 3 Execution

3.1 INSTALLATION

- .1 Install a dewatering system to lower ground surface water in order to permit excavation, construction of structure, and placement of backfill materials to be performed under dry conditions. Make the dewatering system adequate to pre-drain the water-bearing strata above and below the bottom of structure foundations, utilities and other excavations.
- .2 In addition, reduce hydrostatic pressure head in water-bearing strata below structure foundations, utility lines, and other excavations, to extent that water levels in construction area are a minimum of 300 mm below prevailing excavation surface at all times.

3.2 OPERATION

- .1 Prior to any excavation below the ground water table, place system into operation to lower water tables as required and operate it continuously twenty-four (24) hours a day, seven (7) days a week until utilities and structures have been satisfactorily constructed, which includes the placement of backfill materials and dewatering is no longer required.
- .2 Place an adequate weight of backfill material to prevent buoyancy prior to discontinuing operation of the system.

3.3 WATER DISPOSAL

- .1 Dispose of water removed from the excavations in such a manner as:
 - .1 Will not endanger portions of work under construction or completed.
 - .2 Will cause no inconvenience to Parks Canada or to others working near site.

- .3 Will comply with the stipulations of required permits for disposal of water.
- .4 Will Control Runoff: The Contractor shall be responsible for control of runoff in all work areas including but not limited to: excavations, access roads, parking areas, laydown, and staging areas. The Contractor shall provide, operate, and maintain all ditches, basins, sumps, culverts, site grading, and pumping facilities to divert, collect, and remove all water from the work areas. All water shall be removed from the immediate work areas and shall be disposed of in accordance with applicable permits.
- .5 Sedimentation Control measures shall be in place.
- .2 Excavating Dewatering:
 - .1 The Contractor shall be responsible for providing all facilities required to divert, collect, control and remove water from all construction work areas and excavations.
 - .2 Drainage features shall have sufficient capacity to avoid flooding of work areas.
 - .3 Drainage features shall be so arranged and altered as required to avoid degradation of the final excavated surface(s).
 - .4 The Contractor shall utilize all necessary erosion and sediment control measures as described herein to avoid construction related degradation of the natural water quality.
- .3 Dewatering equipment shall be provided to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of work during construction. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flocculation, or other cause will result.

3.4 STANDBY EQUIPMENT

Provide complete standby equipment, installed and available for immediate operation, as may be required to adequately maintain de-watering on a continuous basis and in the event that all or any part of the system may become inadequate or fail.

3.5 DAMAGES

Immediately repair damages to adjacent facilities caused by dewatering operations.

3.6 REMOVAL

Ensure compliance with all conditions of regulating permits and provide such information to the Contract Administrator. Obtain written approval from the Contract Administrator before discontinuing operation of dewatering system.

END OF SECTION

Updated: 2016-07-12 / Approved: 2006-09-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 22 00 - Grading**
- .2 Section 32 10 01 - Granular Base**

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
- .2 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
- .5 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
- .6 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
- .7 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .8 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.
- .9 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
 - .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .10 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.
- .11 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.

1.3 DEFINITIONS

- .1 Excavation classes: two (2) classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: solid material in excess of 1.00 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters, 1 inch, in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to [ASTM D422] [ASTM C136] : Sieve sizes to [CAN/CGSB-8.1] [CAN/CGSB-8.2].
 - .2 Table:

Sieve Designation	% Passing
2.00 mm	[100]
0.10 mm	[45 - 100]
0.02 mm	[10 - 80]
0.005 mm	[0 - 45]
 - .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with **Section 01 33 00 - Submittal Procedures.**
- .2 LEED Submittals:
 - .1 Submit Erosion and Sedimentation Control Plan for Credit SSp1 in accordance with LEED Canada-NC.
- .3 Quality Control: in accordance with **Section 01 45 00 - Quality Control:**
 - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
 - .2 Submit for review by Contract Administrator proposed dewatering methods as described in PART 3 of this Section.
 - .3 Submit to Contract Administrator written notice at least seven (7) days prior to excavation work.
 - .4 Submit to the Contract Administrator written notice when bottom of excavation is reached.
 - .5 Submit to Contract Administrator testing, inspection results 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, location plan of relocated and abandoned services, as required.
- .5 Samples:
 - .1 Submit samples in accordance with **Section 01 33 00 - Submittal Procedures.**
 - .2 Inform Contract Administrator at least four (4) weeks prior to beginning Work, of proposed source of fill, unshrinkable fill materials and provide access for sampling.
 - .3 Submit 70 kg samples of type of fill, unshrinkable fill specified including representative samples of excavated material.
 - .4 Ship samples prepaid to Contract Administrator, in tightly closed containers to prevent contamination and exposure to elements.
 - .5 At least four (4) weeks prior to beginning Work, inform Contract Administrator source of fly ash and submit samples to Contract Administrator.
 - .1 Do not change source of Fly Ash without written approval of Contract Administrator.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Where Contract Administrator is employee of Contractor, submit proof that Work by Contract Administrator is included in Contractor's insurance coverage.
- .3 Submit design and supporting data at least two (2) weeks prior to beginning Work.

- .4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in the Province of Ontario, Canada.
- .5 Keep design and supporting data on site.
- .6 Engage services of qualified professional Engineer who is registered or licensed in the Province of Ontario, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .7 Do not use soil material until written report of soil test results are reviewed by Contract Administrator.
- .8 Health and Safety Requirements:
 - .1 Do construction occupational health and safety in accordance with **Section 01 35 29.06 - Health and Safety Requirements.**

1.6 WASTE MANAGEMENT AND DISPOSAL

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

1.7 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site.
 - .2 Prior to beginning excavation Work, notify Contract Administrator, or the authorities having jurisdiction. Establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.
 - .3 Confirm locations of buried utilities by careful test excavations and soil hydrovac methods.
 - .4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
 - .5 Where utility lines or structures exist in area of excavation, obtain direction of Contract Administrator before re-routing. Costs for such Work to be paid by Contract Administrator.
 - .6 Record location of maintained, re-routed and abandoned underground lines.
 - .7 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
 - .1 Conduct, with Contract Administrator, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Contract Administrator.
 - .3 Where required for excavation, cut roots or branches as directed by Contract Administrator in accordance with **Section 32 01 90.33 - Tree and Shrub Preservation.**

Part 2 Products

2.1 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 C136] [ASTM C117]. Sieve sizes to [CAN/CGSB-8.1] [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 Contract Administrator for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 Unshrinkable fill: proportioned and mixed to provide:
- .1 Maximum compressive strength of 0.4 MPa at 28 days.
.2 Maximum cement content of 25 kg/m³ with 40 by volume fly ash replacement: to CSA-A3001, Type GU.
.3 Minimum strength of 0.07 MPa at 24 h.
.4 Concrete aggregates: to CSA-A23.1/A23.2.
.5 Cement: Type GU.
.6 Slump: 160 to 200 mm.
- .4 Shearmat: honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.
- .5 Geotextiles: to **Section 31 32 19.01 - Geotextiles**.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

walkways, according to requirements of authorities having jurisdiction, and the sediment and erosion control plan, 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.

3.2 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly in accordance with **Section 02 41 13 - Selective Site Demolition**.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with **Section 01 56 00 - Temporary Barriers and Enclosures** 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 Contract Administrator's approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

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

3.5 STOCKPILING

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

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with **Section 01 35 29.06 - Health and Safety Requirements**, Health and Safety Act for the Province of Ontario .
 - .1 Where conditions are unstable, Contract Administrator 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 Contract Administrator.
- .4 During backfill operation:
 - .1 Unless otherwise indicated or directed by Contract Administrator, 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 Contract Administrator.

3.7 DEWATERING AND HEAVE PREVENTION

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

3.8 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated by Contract Administrator.
- .2 Excavation must not interfere with bearing capacity of adjacent foundations.
- .3 For trench excavation, unless otherwise authorized by Contract Administrator in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Contract Administrator.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material off site.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .9 Notify Contract Administrator when bottom of excavation is reached.
- .10 Obtain Contract Administrator's approval of completed excavation.
- .11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Contract Administrator.
- .12 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with fill concrete.
 - .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density in accordance with **Section 31 05 10 - Corrected Maximum Dry density fir Fill.**
- .13 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Contract Administrator.
- .14 Install geotextiles in accordance with **Section 31 32 19.01 - Geotextiles.**

3.9 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698 and ASTM D1557 in accordance with **Section 31 05 10 - Corrected Maximum Dry Density for Fill.**
 - .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 %.
 - .2 500 mm fill.
 - .3 Place unshrinkable fill in areas as indicated.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated in **Section 33 41 00 - Storm Utility Drainage Piping**, as specified in **Section 23 11 26 - Facility Liquid Petroleum Gas Piping**, **Section 33 11 16 - Site Water Utility Distribution Piping**, **Section 33 31 13 - Public Sanitary Utility Sewerage Piping**, **Section 33 34 00 - Sanitary Utility Sewerage Force Mains**.
- .2 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

- .1 Vibratory compaction equipment: to be capable of achieving the specified degree of compaction.
- .2 Do not proceed with backfilling operations until completion of following:
 - .1 Contract Administrator has inspected and approved installations.
 - .2 Contract Administrator has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .6 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within twenty-four (24) hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.3 m.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum fourteen (14) days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Contract Administrator:
 - .2 If approved by Contract Administrator, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Contract Administrator.

3.12 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to **Section 01 74 21 - Construction/Demolition Waste Management and Disposal**, trim slopes, and correct defects as directed by Contract Administrator.

- .2 Replace topsoil as directed by Contract Administrator.
- .3 Reinstate pavements [and sidewalks] disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .4 Clean and reinstate areas affected by Work as directed by Contract Administrator.
- .5 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Updated: 2016-07-12 / Created: 2016-07-11

Part 1 General

1.1 OBJECTIVES

- .1 Prevent the loss of soil from construction site resulting from stormwater runoff, wind erosion and construction activities.
- .2 Prevent the sedimentation of storm ditches and receiving waters.
- .3 Prevent air pollution caused by dust and particulate matter.

1.2 DESCRIPTION OF WORK

- .1 Implement the Erosion and Sedimentation Control (ESC) measures shown on the project drawings and described in these specifications.
- .2 Install ESC products in accordance with manufacturer instructions and the prescribed installation procedures.
- .3 Inspect ESC measures on a weekly basis and following all significant storm events. If deficiencies are found, make repairs within twenty-four (24) hours of detection.

Part 2 Products

- .1 The Sedimentation Control fence shall be a pervious sheet of polypropylene, nylon, polyester, polyethylene or equivalent and have the following characteristics:
 - .1 Filtering Efficiency: 75%-85% (minimum)
 - .2 Tensile Strength at 20% Standard Strength: 0.54 kg/mm (max)
 - .3 Elongation Extra Strength: 0.89 kg/mm
 - .4 Slurry Flow Rate: 15.0 L/m²/min (min)
- .2 Turbidity Curtain (if required) shall be a geotextile material (polypropylene) with the following characteristics:
 - .1 Grab Tensile: 1000 N
 - .2 Grab Elongation: 45-105 N
 - .3 Tear Resistance: 425 N
 - .4 Apparent Opening Size (A.O.S.): 0.15 mm
- .3 Cofferdam (if required) shall be comprised of a high strength geotextile material. Standard of Acceptance: Terrafix Meter Bags or an approved equivalent.

Part 3 Execution

3.1 PROCEDURES

- .1 Stabilization Practices
 - .1 Preservation of Natural Vegetation

- .1 Establish construction boundaries to limit site disturbance to 4.55 m beyond centre line of road.
- .2 Stakes shall be used to indicate limits of construction, grading and disturbance. Trees shall be clearly marked to be preserved and protected from the ground disturbances around the base.
- .2 Structural Practices
 - .1 Silt Fence
 - .1 Construct posts with filter fabric media to remove sediment from stormwater volumes flowing through the fence.
 - .2 The lower edge of the fence is to vertically trenched and covered by backfill.
 - .2 Turbidity Curtain
 - .1 Install Turbidity Curtain to protect wetlands from sedimentation, when working in the wetlands.
 - .2 Turbidity Curtain shall be installed to OPSD 219.26 and to the manufacturer's instructions.

3.2 INSPECTIONS AND MAINTENANCE

- .1 Inspect all control measures at least once each week (unless otherwise noted) and following any significant storm (13 mm of precipitation or greater). Complete the inspection log for each inspection, and keep in an accessible location on site until all corrective measures have been documented. Submit each completed log to the Owner's Representative for review.
- .2 Maintain all measures in good working order. If a repair is necessary, initiate within twenty-four (24) hours of report.
- .3 Silt fence: Silt fence to be inspected for depth of sediment, tears, loose fabric attachment at fence posts, channel erosion beneath fence, sagging or collapse, and to ensure the fence posts are firmly in the ground. Built-up sediment is to be removed from silt fence when it has reached 1/3 the height of the fence. Repair such that fence is original installation condition.

3.3 REMOVAL OF PRODUCTS

- .1 ESC measures shall not be removed and shall be fully inspected and maintained until directed by the Contract Administrator.

END OF SECTION

Updated: 2016-07-12 / Approved: 2011-06-30

Part 1 General

1.1 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- .1 All granular material to be used in this Contract will be supplied by the Contractor. Payment for supply, placing, grading and compaction will be included in the Lump Sum Bid for the Contract.

1.3 MEASUREMENT AND PAYMENT (NOT APPLICABLE)

- .1 This is a Lump Sum Contract. There will be no measurement for payment.

1.4 REFERENCES

- .1 ASTM International
 - .1 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .5 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .6 ASTM D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
 - .7 ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .8 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .4 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.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with **Section 01 33 00 - Submittal Procedures.**
- .2 Sustainable Design Submittals:
 - .1 LEED Canada-NC Version 1.0 Submittals: in accordance with [Section 01 35 21 - LEED Requirements].
 - .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction **Section 01 35 21 - LEED Requirements.**
 - .3 Construction Waste Management:
 - .1 Submit project Waste Management Plan and/or Waste Reduction Workplan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50 % of construction wastes were recycled or salvaged.
 - .4 Regional Materials: submit evidence that project incorporates required percentage 20 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with **Section 01 61 00 - Common Product Requirements** with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations, erosion and sedimentation control plan.
 - .2 Replace defective or damaged materials with new.
- .3 Develop Construction Waste Management Plan and/or Waste Reduction Workplan related to Work of this Section and in accordance with **Section 01 35 21 - LEED Requirements.**

Part 2 Products

2.1 MATERIALS

- .1 Granular A – to OPSS 1010.
- .2 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 C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 and 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]
2.00 mm	[15-80]	-	-	[13-42]
0.425 mm	[4-50]	[5-30]	[0-30]	[5-28]
0.180 mm	-	-	-	-
0.075 mm	[0-8]	[0-10]	[0-8]	[2-10]

- .4 Other properties as follows:
- .1 Liquid Limit: to [ASTM D4318], Maximum 25.
 - .2 Plasticity Index: to [ASTM D4318], Maximum 6.
 - .3 Los Angeles degradation: to [ASTM C131].
 - .1 Maximum loss by mass: 50 %.
 - .4 Particles smaller than 0.02 mm: to [ASTM D422], Maximum 3%.
 - .5 Soaked CBR: to [ASTM D1883], Minimum 40 when compacted to 100% of [ASTM D1557].

Part 3 Execution

3.1 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 Contract Administrator.
 - .2 Inform Contract Administrator 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 Contract Administrator.

3.2 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.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Contract Administrator.
- .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 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
 - .1 Contract Administrator may authorize thicker lifts 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 portion of layer in which material has become segregated during spreading.

3.4 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 98% of standard Proctor Density is required.
- .3 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 Contract Administrator before use.
- .4 Equipped with device that records hours of actual work, not motor running hours.
- .5 Compact to density of not less than 98% in accordance with ASTM D698 and ASTM D1557.
- .6 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .7 Apply water as necessary during compaction to obtain specified density.
- .8 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Contract Administrator. This will particularly apply to the 0.6 m wide gravel shoulders supporting the edge of pavement.
- .9 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.5 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 maximum.

- .2 Obtain written approval from Contract Administrator 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, Contract Administrator 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 Contract Administrator.
 - .2 Backfill excavated subgrade with sub-base material 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.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 - Cleaning**.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .3 Waste Management: separate waste materials for recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 SITE TOLERANCES

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

3.8 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 Contract Administrator.

END OF SECTION

Updated: 2016-07-12 / Approved: 2012-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 12 16.

1.2 PRODUCTS INSTALLED

- .1 The Contractor will supply and install all products referred to in this section. There will be no measurement for payment as all compensation for this work is included in the Lump Sum Bid for this Contract.

1.4 REFERENCES

- .1 American Association of State Highway and Transportation Officials (AASHTO)
- .1 AASHTO M081-92-UL-04, Standard Specification for Cutback Asphalt (Rapid-Curing Type).
- .2 ASTM International
- .1 ASTM D140/D140M-09, Standard Practice for Sampling Bituminous Materials.
- .2 ASTM D633-11, Standard Volume Correction Table for Road Tar.
- .3 ASTM D1250-08, Standard Guide for Use of the Petroleum Measurement Tables.
- .3 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum 2007).
- .2 LEED Canada-NC-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.
- .3 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
- .4 LEED Canada-EB: O M-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.
- .4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.5 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 tack coat] and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit two (2) - 4 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth bottles made with plastic to Contract Administrator, at least two (2) weeks prior to beginning Work.
 - .2 Sample asphalt tack coat material to: ASTM D140.
 - .3 Provide access on tank truck for Contract Administrator to sample asphalt material to be incorporated into Work to ASTM D140.
- .4 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with **Section 01 35 21 - LEED Requirements**.
 - .2 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 50% of construction wastes were recycled or salvaged.
 - .3 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages of recycled content materials and products, showing their costs and percentages of post-consumer content, and total cost of materials for project.
 - .4 Regional Materials: submit evidence that project incorporates required percentage 20 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.6 QUALITY ASSURANCE

- .1 Upon request from Contract Administrator, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

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

- .4 Deliver, store and handle materials in accordance with [ASTM D140].
- .5 Provide, maintain and restore asphalt storage area.
- .6 Develop Construction Waste Management Plan related to Work of this Section and in accordance with **Section 01 35 21 - LEED Requirements**.
- .7 Packaging Waste Management: remove for reuse by manufacturer of packaging materials as specified in Construction Waste Management Plan in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management And Disposal**, and with the Waste Reduction Workplan.

Part 2 Products

2.1 MATERIALS

- .1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: [SS-1] [SS-1h].
- .2 Cut-back asphalt; to AASHTO M081-92-UL, grade RC-70 or RC-250.
- .3 Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

- .1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.
- .2 Pressure distributor:
 - .1 Designed, equipped, maintained and operated so that asphalt material can be:
 - .1 Maintained at even temperature.
 - .2 Applied uniformly on variable widths of surface up to 5 m.
 - .3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m².
 - .4 Distribute in uniform spray without atomization at temperature required.
 - .2 Equipped with meter, registering travel in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
 - .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
 - .4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
 - .1 Measure temperature to closest whole number.
 - .5 Equipped with accurate volume measuring device or calibrated tank.

- .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
- .7 Equipped with nozzle spray bar, with operational height adjustment in increments of .06 metres and capable of being raised or lowered.
- .8 Cleaned if previously used with incompatible asphalt material.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt tack coat installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Contract Administrator.
 - .2 Inform Contract Administrator 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 Contract Administrator.

3.2 APPLICATION

- .1 Apply asphalt tack coat only on clean and dry surface.
- .2 Dilute asphalt emulsion with water at 1:1 ratio for application.
 - .1 Mix thoroughly by pumping or other method approved by Contract Administrator.
- .3 Apply asphalt tack coat evenly to pavement surface at rate as directed by Contract Administrator, between 0.3 and 0.7 L/m² but not to exceed 0.7 L/m².
- .4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.
- .5 Apply asphalt tack coat only when air temperature greater than ten (10) degrees C and when rain is not forecast within two (2) hours minimum of application.
- .6 Apply asphalt tack coat only on unfrozen surface.
- .7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Contract Administrator.
- .8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
 - .1 Control traffic in accordance with **Section 01 35 00.06 - Special procedures for Traffic control.**
- .9 Keep traffic off tacked areas until asphalt tack coat has set.
- .10 Re-tack contaminated or disturbed areas as directed by Contract Administrator.
- .11 Permit asphalt tack coat to set break before placing asphalt pavement.

- .12 Submit summary report within seven (7) days minimum of date of application and include information as follows:
 - .1 Total area tack coated.
 - .2 Quantity of tack coat used.
 - .3 Mean application rate.
 - .4 Actual product quantity used when using equipment on pressure distributors.
 - .5 Dipstick measurements or electronic printouts are acceptable.
- .13 Carry out measurements in presence of Contract Administrator upon request.
- .14 Inspect tack coat application to ensure uniformity.
 - .1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by Contract Administrator.
 - .2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 – Cleaning**.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .3 Waste Management: separate waste materials for recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Updated: 2016-08-12 / Approved: 2011-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 **Section 32.12.13.16** – See also **O.P.S.S. 310, 1003, 1150**

1.2 PRODUCTS SUPPLIED AND INSTALLED UNDER THIS SECTION

- .1 Hot mix HL3 and hot mix HL4
- .2 Measurements and payments: This is a lump sum contract. The asphalt cement and all other products used in the asphalt paving operation will be supplied by the Contractor. The entire cost of the paving operation will be included in the Bidders' Lump Sum Tender. No measurement for payment will be required.

1.3 REFERENCES

- .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 C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- .2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
- .4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
- .5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
- .6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .7 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- .8 ASTM C207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.

- .9 ASTM D995-[-95b(2002)], Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .10 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .11 ASTM D3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .4 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
- .5 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.
- .6 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with **Section 01 33 00 - Submittal Procedures**.
- .2 Product Data:
 - .1 Submit Manufacturer's instructions, printed product literature and data sheets for 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 four (4) weeks prior to beginning Work.
- .3 Samples:
 - .1 Inform Contract Administrator of proposed source of aggregates and provide access for sampling four (4) weeks prior to beginning Work.
 - .2 Submit samples of following materials proposed for use four (4) weeks prior to beginning Work.
 - .1 One five 5 L container of asphalt cement.
 - .2 One 1 kg of hydrated lime.
- .4 Test and Evaluation Reports:
- .5 Certificates:
 - .1 Certification to be marked on pipe.
- .6 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 Contract Administrator for review at least four (4) weeks prior to beginning Work.
- .4 Submit printed record of mix temperatures at end of each week.
- .7 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with **Section 01 35 21 - LEED Requirements**.
 - .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with EPA 832/R-92-2005 authorities having jurisdiction **Section 01 35 21 - LEED Requirements**.
 - .3 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 50 % of construction wastes were recycled or salvaged.
 - .4 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer content, 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].
 - .5 Regional Materials: submit evidence that project incorporates required percentage 20 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with **Section 01 61 00 - Common Product Requirements** with Manufacturer's written instructions.
- .2 Deliver and stockpile aggregates in accordance with **Section 31 05 16 - Aggregate Materials** and erosion and sedimentation control plan. Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.
- .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 Contract Administrator copies of freight and waybills for asphalt cement as shipments are received.
 - .1 Contract Administrator reserves right to check weights as material is received.
- .7 Stockpile crushed RAP separately in accordance with **Section 31 05 16 - Aggregate Materials** as indicated where directed by Contract Administrator.
- .8 Protect and cover stockpiles of crushed RAP from rain to approval of Contract Administrator in accordance with erosion and sedimentation control plan **Section 01 35 21 -LEED Requirements.**
- .9 Develop Construction Waste Management Plan related to Work of this Section and in accordance with **Section 01 35 21 - LEED Requirements.**
- .10 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements.**

Part 2 Products

2.1 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 C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 and 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 C136.

- .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 D2419. Min: 50.
- .9 Magnesium Sulphate soundness: to ASTM C88. 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 C131. Max % loss by mass:
 - .1 Coarse aggregate, surface course: 25 %.
 - .2 Coarse aggregate, lower course: 35 %.
- .11 Absorption: to ASTM C127. Max % by mass:
 - .1 Coarse aggregate, surface course: 1.75 %.
 - .2 Coarse aggregate, lower course: 2.00 %.
- .12 Loss by washing: to ASTM C117. 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 C123. 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 D4791, (with length to thickness ratio greater than 5):
 - .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 one (1) minimum freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.

Passing	Retained on	
[25] mm	to	[12.5] mm
[12.5] mm	to	[_____] mm

- .16 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.
- .3 Mineral filler:
 - .1 Ensure finely ground particles of limestone, hydrated lime, Portland cement or non-plastic mineral matter approved by Contract Administrator are thoroughly dry and free from lumps.
 - .2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Contract Administrator to improve mix properties.

- .3 Ensure mineral filler is dry and free flowing when added to aggregate.
- .4 Anti-stripping agent: hydrated lime to ASTM C207 type N.
 - .1 Add lime at rate of approximately 2-3 % of dry weight of aggregate.
- .5 Water: to approval of Contract Administrator.

2.2 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 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by, 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 Contract Administrator for performing tests, keeping records and making reports.

2.3 MIX DESIGN

- .1 Mix design to be approved in writing by Contract Administrator.
- .2 Mix design to be developed by testing laboratory approved in writing by Contract Administrator.
- .3 Design of mix: by Marshall Method to requirements below.
 - .1 Compaction blows on each face of test specimens: 50.
 - .2 Mix physical requirements:

Property	Airfield Pavements	Roads	Sheet Asphalt
Marshall Stability at 60	[7.0]	[5.5] surface	[3.0]

degrees C kN min		course/[4.5] lower course	
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 C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
 - .3 Air voids: to ASTM D3203.
 - .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 Contract Administrator When change in material source proposed, new job-mix formula to be reviewed by Contract Administrator.
- .5 Return plant dust collected during processing to mix in quantities acceptable to Contract Administrator.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving in accordance with Manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Contract Administrator.
 - .2 Inform Contract Administrator 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 Contract Administrator.

3.2 PLANT AND MIXING REQUIREMENTS

- .1 Batch and continuous mixing plants:
 - .1 To ASTM D995.
 - .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 Contract Administrator after combining with RAP (if used).
- .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 Contract Administrator. Do not heat asphalt cement above maximum temperature indicated on temperature-viscosity chart 160 degrees C.
- .9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Contract Administrator to review 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 Contract Administrator. 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 Contract Administrator but not less than 45s.
 - .3 Mixing time as directed by Contract Administrator.
- .12 Where RAP is to be incorporated into mix:
 - .1 Feed from separate cold feed bin specially designed to minimize consolidation of material.
 - .1 Provide 50 mm scalping screen on cold feed to remove oversized pieces of RAP.
 - .2 Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti-rollback device to prevent material from sliding backward on feed belt.
 - .3 Combine RAP and new aggregates in proportions as directed by Contract Administrator. Dry mix thoroughly, until uniform temperature within plus or minus 5 degrees C of mix temperature, as directed by Contract Administrator, is achieved prior to adding new asphalt cement.
 - .1 Do not add new asphalt cement where temperature of dried mix material is above 160 degrees C.
- .2 Dryer drum mixing plant:
 - .1 To ASTM D995.
 - .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 Where RAP is to be incorporated into mix, dryer drum mixer is to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180 degrees C.
- .5 Feed RAP from separate cold feed bin designed to minimize reconsolidation of material.
- .6 Meter total flow of aggregate and RAP 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 ,RAP and asphalt entering mixer remain constant.
- .7 Allow for easy calibration of weighing systems for aggregates and RAP without having material enter mixer.
- .8 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 %.
- .9 Make provision for conveniently sampling full flow of materials from cold feed.
- .10 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.
- .11 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .12 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 week.
- .13 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 three (3) hour.

.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 1/4%.

.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.

3.3 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

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

.2 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** and **Section 32 01 16.13 - Reshaping Asphalt Pavement**.

.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 Contract Administrator before beginning paving operations.

.4 Apply tack coat in accordance with **Section 32 12 13.23 - Asphalt Prime Coats** and **Section 32 12 13.16 - Asphalt Tack Coats** prior to paving.

.5 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 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 Contract Administrator 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 Contract Administrator, but not less than 135 degrees C.

3.5 TEST STRIP

- .1 Construct and test strip to approval of Contract Administrator.
- .2 Construct test strip with at least 500 tonnes of mix, and involving more than one lane, so that joint finishing techniques can be established.
- .3 During construction of test strip, Contract Administrator 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.

3.6 PLACING

- .1 Obtain Contract Administrator approval of existing surface, tack coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as directed by Contract Administrator.
- .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 Lower course in 1 layer of 50 mm each.
 - .2 Surface course in 1 layer of maximum 40 mm each.
- .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 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings.
 - .1 Contract Administrator to establish lines for paver to follow parallel to centerline of proposed pavement to the satisfaction of the Contract Administrator. 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 100 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.
 - .8 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 broadcast 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.

3.7 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 Contract Administrator.
- .3 Roll asphalt continuously to density not less than 98 % of 50 blow Marshall density to AASHTO T245.
- .4 General:
 - .1 Provide at least two (2) rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two (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 twenty-five (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 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 Contract Administrator.
 - .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 Contract Administrator.
 - .2 Conduct rolling operations in close sequence.

3.8 JOINTS

- .1 General:
 - .1 Remove surplus material from surface of previously laid strip.
 - .1 Do not deposit on surface of freshly laid strip.
 - .2 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 300 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 If cold joint cannot 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 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.

3.9 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: clean in accordance with **Section 01 74 11 - Cleaning**.
 - .1 Leave Work Area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .3 Waste Management: separate waste materials for recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.

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

END OF SECTION

Updated: 2016-07-12 / Approved: 2014-12-31

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 32.12.16., O.P.S.S. 1712, and O.P.S.S. 1750**

1.2 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.
.4 Supply of reflective glass beads.
.5 Symbols and letters.

1.3 REFERENCES

- .1 Canada Green Building Council (CaGBC)
.1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
.2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
.3 LEED Canada 2009 for Design and Construction-[2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
.4 LEED Canada for Existing Buildings, Operations and Maintenance-[2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.
.2 Environment Canada (EC)
.1 Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations, SOR/2009-264.
.3 Green Seal (GS)
.1 GS-11-[2013], Standard for Paints and Coatings.
.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).
.5 Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.
.1 MPI #32 Traffic Markings Paint, Alkyd.
.6 South Coast Air Quality Management District (SCAQMD)

- .1 SCAQMD Rule 1113-[13], Architectural Coatings.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with **Section 01 33 00 - Submittal Procedures.**
- .2 Product Data:
 - .1 Submit Manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two (2) copies of WHMIS MSDS in accordance with **Section 01 35 43 - Environmental Procedures** and **section 01 35 29.06 - Health and Safety Requirements.**
- .3 Samples:
 - .1 Submit to Contract Administrator following material sample quantities at least [4] weeks prior to commencing work.
 - .1 Two (2) 1 L samples of each type of paint.
 - .2 One (1) 1 kg sample of glass beads.
 - .3 Sampling to MPI Painting Manual.
 - .2 Mark samples with name of project and its location, paint Manufacturer's name and address, name of paint, MPI specification number and formulation number and batch number.
- .4 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with **Section 01 35 21 - LEED Requirements.**
 - .2 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 50 % of construction wastes were recycled or salvaged.
 - .3 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer content, and total cost of materials for project.
 - .4 Regional Materials: submit evidence that project incorporates required percentage 20 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
 - .5 Low-Emitting Materials: submit listing of paints and coatings to comply with VOC and chemical component limits or restrictions requirements.

1.5 CLOSEOUT SUBMITTALS

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

- .2 Operations and Maintenance Data: submit information on materials relative to work of this Section for inclusion in operations and maintenance manual:

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with **Section 01 61 00 - Common Product Requirements** with Manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with Manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors 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 related to Work of this Section and in accordance with **Section 01 35 21 - LEED Requirements**.
- .5 Packaging Waste Management: remove for reuse by Manufacturer of packaging materials, pallets, crates, padding, as specified in Construction Waste Management Plan in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.

1.7 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.

Part 2 Products

2.1 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 1 to SCAQMD Rule 1113 and to GS-11 Standard
 - .3 Paints: in accordance with MPI recommendation for surface conditions.
 - .4 Colour: to MPI listed, white and green
 - .5 Upon request, Contract Administrator will supply qualified product list of paints applicable to work. Qualified paints may be used but Contract Administrator 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.

Part 3 Execution

3.1 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 Contract Administrator.
- .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.

3.2 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.

3.3 TRAFFIC CONTROL

- .1 Keep traffic off fresh pavements markings for two (2) hours.

3.4 APPLICATION

- .1 Pavement markings: laid out by Contractor's Surveyor
- .2 Unless otherwise approved by Contract Administrator, apply paint only when air temperature is above ten (10) degrees C, wind speed is less than sixty (60) km/h and no rain is forecast within next four (4) hours.
- .3 Apply traffic paint evenly at rate of three (3) m²/L.
- .4 Do not thin paint unless approved by Contract Administrator.
- .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.

3.5 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.**

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 - Cleaning.**
 - .1 Leave Work Area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning.**
 - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.
- .3 Waste Management: separate waste materials for recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements.**
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

- .1 Protect pavement markings until dry.
- .2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION

Updated: 2016-07-12 / Approved: 2011-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31.05.16.

1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- .1 Parks Canada and their representative will not supply any material except the eco-structures. The Contractor will supply all other materials.

1.3 MEASUREMENT AND PAYMENT

- .1 Payment for pipe culverts and all related Work (supply, excavation, dewatering, bedding, backfill, rip rap and restoration) will be included in the lump sum contract price.

1.4 REFERENCES

- .1 ASTM International
- .1 ASTM C14M-07, Standard Specification for Non-reinforced Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
 - .2 ASTM C76M-10a, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
 - .3 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .4 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM C144-04, Standard Specification for Aggregate for Masonry Mortar.
 - .6 ASTM C443M-10, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
 - .7 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .8 ASTM D1248-05, Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable.
 - .9 ASTM F667-06, Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.
- .2 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
- .3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .4 CSA International

- .1 CSA A3000-08, Cementitious Materials Compendium.
- .2 CSA A257 Series-09, Standards for Concrete Pipe and Manhole Sections.
- .3 CAN/CSA G401-07, Corrugated Steel Pipe Products.
- .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.

1.5 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 pipes and backfill, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Inform Contract Administrator at least four (4) weeks before beginning Work, of proposed source of bedding materials and provide access for sampling.
 - .2 Submit to Contract Administrator for testing, at least four (4) weeks before beginning Work, samples of materials proposed for use.
- .4 Certification: to be marked on pipe.
- .5 Test and Evaluation Reports:
 - .1 Submit Manufacturer's test data and certification at least four (4) weeks prior to beginning Work.
- .6 Sustainable Design Submittals:
 - .1 LEED Canada-NC Version 1.0 Submittals: in accordance with **Section 01 35 21 - LEED Requirements.**
 - .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with EPA 832/R-92-2005 **Section 01 35 21 - LEED Requirements.**
 - .3 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 50 % of construction wastes were recycled or salvaged.
 - .4 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer content, 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].
- .5 Regional Materials: submit evidence that project incorporates required percentage 10 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with **Section 01 61 00 - Common Product Requirements 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 accordance with Manufacturer's recommendations.
 - .2 Store and protect pipes from damage.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with **Section 01 35 21 - LEED Requirements.**
- .5 Packaging Waste Management: remove for reuse by Manufacturer of packaging materials as specified in Construction Waste Management Plan in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements.**

Part 2 Products

2.1 CORRUGATED STEEL PIPE

- .1 N/A

2.2 CONCRETE PIPE

- .1 N/A

2.3 CORRUGATED POLYETHYLENE PIPE AND FITTINGS

- .1 To ASTM F667.
 - .1 Polyethylene resin: to ASTM D1248, grade [W8] [W9].
 - .2 Weathering resistance: to ASTM D1248, Class C.
 - .3 Pipe stiffness to be 320 kPa.

2.4 GRANULAR BEDDING [AND BACKFILL]

- .1 Granular "A" material meeting the requirements of O.P.S.S. 1010 or, in wet conditions, with the approval of the Contract Administrator, 20 mm clear crushed stone.

2.5 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pipe culvert installation in accordance with Manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Contract Administrator.
 - .2 Inform Contract Administrator 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 Contract Administrator.

2.6 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
 - .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.

2.7 TRENCHING

- .1 Do trenching Work in accordance with **Section 31 23 33.01 - Excavating, Trenching and Backfilling.**
- .2 Obtain Contract Administrator approval of trench line and depth prior to placing bedding material or pipe.

2.8 BEDDING

- .1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.
- .2 Place 150 mm minimum thickness of approved granular material on bottom of excavation and compact to 95% minimum of maximum density to ASTM D698.
- .3 Shape bedding to fit lower segment of pipe exterior so that width of at least 50 % of pipe diameter is in close contact with bedding and to camber as indicated or as directed by Contract Administrator free from sags or high points.
- .4 Place bedding in unfrozen condition.

2.9 LAYING CORRUGATED STEEL PIPE CULVERTS

- .1 N/A

2.10 JOINTS: CORRUGATED STEEL CULVERTS

- .1 N/A

2.11 LAYING CONCRETE PIPE CULVERTS

.1 N/A

2.12 JOINTS: CONCRETE PIPE CULVERTS

.1 N/A

2.13 LAYING CORRUGATED POLYETHYLENE PIPE CULVERTS

- .1 Begin laying at downstream end of culvert.
- .2 Install pipe in trench by lowering.
- .3 Ensure bottom of pipe is in contact with shaped bedding throughout pipe length.
- .4 Allow water to flow through pipes during construction only as permitted by Contract Administrator.

2.14 JOINTS FOR POLYETHYLENE CULVERTS

.1 Use bell and spigot gasketed pipe.

2.15 BACKFILLING

- .1 Backfill around and over culverts as indicated or as directed by Contract Administrator.
- .2 Place granular backfill material in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
- .3 Compact each layer to 95 % maximum density to ASTM D698 taking special care to obtain required density under haunches.
- .4 Protect installed culvert with minimum 600 mm cover of compacted fill before heavy equipment is permitted to cross.
 - .1 During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.
- .5 Place backfill in unfrozen condition.

2.16 FLUMING

.1 N/A

2.17 CLEANING

- .1 Progress Cleaning: clean in accordance with **Section 01 74 11 - Cleaning**.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with **Section 01 74 11 - Cleaning**.
- .3 Waste Management: separate waste materials for recycling in accordance with **Section 01 74 21 - Construction/Demolition Waste Management and Disposal** and **Section 01 35 21 - LEED Requirements**.

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

END OF SECTION