SPECIFICATION MANUAL

Lane Repair
Port of Entry
Coutts/Sweetgrass

PWFSC Project No. R.078073.002

April 28, 2016

Associated Engineering Alberta Ltd.
1001, 400 – 4th Avenue South
Lethbridge, AB
T1J 4E1

TABLE OF CONTENTS

PAGES

DIVISION 31 - EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

END OF DOCUMENT

1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this contract comprises removal of an existing asphalt lane, and reconstruction of roadway with Portland Cement Concrete Pavement (PCCP).

.2 The work includes, but is not limited to:

.1 "Prime Contractor" responsibilities.

.2 Project management and coordination.

.3 Quality control.

.4 Traffic accommodation, plans, detours and signage.

.5 Safeguards of work areas.

.6 Specified contract layout and surveying.

.7 Waste excavation and disposal.

.8 Overall site drainage and runoff during construction and erosion control measures, and related environmental controls.

.9 Adjustment of manhole frame and cover.

.10 Roadway construction, PCCP and tie-in to existing asphalt paving.

.11 Miscellaneous and related works.

.3 Any work called for in the specifications or shown on the drawings, but not specifically mentioned as an item for which payment will be made, shall be considered necessary, but incidental to the item of work for which prices are tendered, and no additional payment will be made for this incidental work.

.4 Coordinate with PWGSC Departmental Representative as required to execute the Work.

.5 Perform all detailed construction survey including control survey for BM tolerance and as-built survey acceptance, and pre-construction survey and measurement of pavement markings and features for re-installation post construction.

.6 The work under all Sections, unless specifically stated otherwise, shall include the furnishings of all materials, products, labour and transportation necessary to complete the work. The intent is that a complete job is called for.

1.2 CONTRACT METHOD

.1 Construct the Work under a unit price contract.

1.3 SCHEDULE

.1 Schedule work to be complete within six (6) weeks of the Notice to Proceed. No work shall begin prior to September 8th, 2016.

.2 Perform Work in conformity with all requirements of the specifications and regulations identified in Section 01 41 00.

1.4 CONTRACTOR USE OF PREMISES

.1 Contractor shall have NO access to the existing buildings.

.2 Contractor laydown area shall be at the north end of the truck parking lot, but not blocking gates of the impound yard.

.3 Ascertain and abide by conditions pertaining to use of lands, easements or rights-of-way.

.4 Assume full responsibility for protection and safekeeping of products under this Contract.

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

.6 Notices to be distributed at the project location 48 hours prior to commencing Works in that location.

.7 Maintain the Site in a clean and tidy manner for public and worker safety and general appearances.

.8 Coordinate use of premises under direction of Departmental Representative.

1.5 OWNER OCCUPANCY

.1 Departmental Representative will occupy premises during entire construction period for execution of normal operations. The existing truck lane west of the construction area will be in full operation during construction.

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

1.6 ASPHALT REMOVAL

.1 Saw cut all existing asphalt for removal offsite.

1.7 GRADING

.1 Excavate to grades shown on the contract drawings , and dispose of waste excavation off-site.

.2 Take precautions necessary to protect existing buildings, site features, utilities and sub-surface features during the construction of work.

.3 Subsurface Conditions

.1 Promptly notify Departmental Representative in writing if subsurface conditions at Place of the Work differ materially from those indicated in Contract Documents, or reasonable assumption of probably conditions based thereon.

.2 After prompt investigation, should Departmental Representative determine that conditions do differ materially; instructions will be issued for changes in the Work as provided in the contract procedures for Changes in the Work.

1.8 SURFACE DRAINAGE

.1 The Contractor is responsible to maintain site drainage as required to protect his own works; and is responsible to maintain existing sedimentation and erosion control provisions and materials that are on the project site.

.2 Prevent silt and sediment deposition into existing courses or systems and/or new work.

1.9 ROADWAY CONSTRUCTION

.1 Trim, shape and bring excavation to design final subgrade.

.2 Supply and place granulars, including moisture conditioning, as indicated and/or shown on the drawings.

1.10 PORTLAND CEMENT CONCRETE PAVING

.1 Supply and place all epoxy coated smooth dowels at mid-slab in prefabricated dowel baskets.

.2 Install 20% edge thickening by 1.5m length along each end of PCCP. This thickening is deemed included in the unit price, square metre PPCP

.3 Complete concrete work in a minimum number of stages. Float finish with grooves to within 75mm of concrete edges.

.4 Install 2 applications of curing compound.

.5 Saw cut contraction joints at 4m intervals and seal with joint sealant.

.6 Reset manhole frame and cover to match concrete pavement finished elevation. Install concrete joint around manhole as shown on the contract drawings.

.7 Provide quality control testing and if requested, trial batch testing.

1.11 RESTORATION

.1 Clean site of any construction debris.

.2 Restore all paint markings effected by construction.

1.12 TEMPORARY FACILITIES

.1 Provide all temporary facilities and utilities required for Contractor's own work.

1.13 FIELD ENGINEERING

.1 .1 Survey Requirements

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

.2 Establish lines and levels, locate and layout, by instrumentation.

.3 Perform all Construction Layout, specified Quantity surveys, and as-built elevations.

.4 Perform all detailed construction survey including control survey for BM tolerance and check that BM elevations are within tolerance. Check random spot elevation and confirm that existing survey is acceptable. If not, find solutions and ask for Departmental Representative approval.

.5 Survey existing pavement marking location with all dimensions to be used for after construction pavement marking.

.2 Records

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

.2 Maintain record drawings and provide access to Consultant for review during inspections.

.3 Provide digital as-built survey data upon completion of project along with redline construction drawings showing any field changes.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

.1 The Contactor shall have no access to existing buildings.

.2 Ingress and egress of Contractor vehicles at site to follow standard traffic movement with parking allowed at the north end of the truck parking lot.

1.2 USE OF SITE AND FACILITIES

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

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

.3 Contractor to provide own sanitary facilities.

1.3 EXISTING SERVICES

.1 Protect all existing utilities and features not specified for removal.

.2 Construct barriers in accordance with Section 01 56 00 - Temporary Controls.

1.4 SPECIAL REQUIREMENTS

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 CONSTRUCTION SCHEDULE

.1 Contractor to supply detailed Construction Progress Schedule - Bar (GANTT) Chart within 10 days after award of contract.

.2 Contractor to provide updated schedule at each project meeting.

.3 The Construction schedule is subject to approval by the Departmental Representative. If any revisions are deemed necessary by the Departmental Representative, the Contractor must revise the schedule at no additional cost to the Departmental Representative.

.4 The construction schedule must display each component of the Work separately, and display the sequencing of these components to complete the Work.

.5 The construction schedule must demonstrate that each component of the Work is scheduled such that the Work can be completed by the specified Contract Completion Date.

1.2 PRECONSTRUCTION MEETING

.1 Consultant will administer pre-construction meeting at project start up at the Consultant’s office. Progress meetings to be held on site, weekly during construction, and as requested by the Departmental Representative.

.2 Contractor's superintendent to attend all meetings, Representatives of major Subcontractors to attend site meetings when requested.

.3 Representatives of Contractor, Subcontractor and suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.

.4 Agenda to include the following:

.1 Appointment of official representative of participants in the Work.

.2 Contractor’s safety program, PPE, and Health and Safety requirements.

.3 Requirements for permits, advance notification of projects, sign in and out procedures.

.4 Schedule of Work, progress scheduling, reports, communication and correspondence, schedule of submissions, delivery of materials.

.5 Requirements for temporary facilities, offices, storage sheds, utilities, fences.

.6 Site security, on site job postings.

.7 Quality Control, appointment of inspection firms.

.8 Contemplated change orders, procedures, approvals required, and administrative requirements, cost break downs.

.9 Record drawings, take over procedures.

.10 Monthly progress claims, administrative procedures, photographs, holdbacks

.11 Insurances

.12 Sub-contractor's confirmation of acceptance of their allocation within the overall project schedule.

1.3 PROGRESS MEETINGS

.1 Progress meetings will be held weekly or as determined at the pre-construction meeting and when requested by the Departmental Representative.

.2 Progress meetings will be held on-site.

.3 The Consultant will give to all parties a minimum of 5 days advance notice of meeting dates, times and locations.

.4 The Contractor shall have in attendance the Superintendent, the Project Manager and representatives of the Subcontractors if requested by the Departmental Representative.

.5 The Departmental Representative will have the Project Manager and/or the Consultant in attendance.

.6 Minutes will be taken by the Consultant and copies will be distributed to attendees within 3 days after meeting.

.7 Agenda for progress meetings to include the following:

- Contractor's minutes of weekly safety meeting copied to Departmental Representative
- Safety record of contractor/manual/designate.
- Review and approve minutes from last meeting.
- Safety concerns.
- Environmental concerns.
- Review of Work progress since previous meeting.
- Field observations, problems, conflicts.
- Problems which might impede construction schedule.
- Corrective measures and procedures to regain projected schedule.
- Revisions to construction schedule.
- Progress, schedule, during succeeding period.
- Review submittal schedules: expedite as required.
- Maintenance of quality standards.
- Pending changes and substitutions.
- Review proposed changes for effect on construction schedule
- Other business.

1.4 PROGRESS REPORTS

.1 The Contractor must maintain an accurate record of the progress of the Work.

.2 Submit an updated and current status report to the Departmental Representative at each Construction Progress Meeting, addressing each component of the work identified on the approved Construction Schedule.

.3 The reports shall state dates of commencement and percentage of work completed by trades for each project component of the Work, and shall relate to the Schedule.

.4 The reports shall explain any delay reflected in the construction schedule and the corrective actions which are being taken to maintain progress on schedule.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

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

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

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

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

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

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

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

1.2 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, certificates, notices, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

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

.4 Allow 5 days for Consultant's review of each submission.

.5 Adjustments made on shop drawings by Consultant or Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

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

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.9 After Consultant's review, distribute copies.

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

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

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by consultant.

- .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.

- .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.

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

.15 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.16 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

.1 If requested, submit for review samples in as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's site office.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.5 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

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

1.4 CERTIFICATES AND TRANSCRIPTS

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

.2 After award of Contract, submit Notice of Project to the local Provincial Authority.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 REFERENCE STANDARD

.1 Regulate traffic in accordance with Uniform Traffic Control Devices for Canada. (Council of Uniform Traffic Devices for Canada distributed by Roads and Transportation Association of Canada), except where specified otherwise.

1.2 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out work or haul materials or equipment.

.2 When working on travelled way:

.1 Place equipment in position to present minimum of interference and hazard to travelling public.

.2 Keep equipment units as close together as working conditions will permit and preferably on same side of travelled way.

.3 Do not leave equipment on travelled way overnight.

.3 Do not close any lanes of road or highway without approval of Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in Part D of Uniform Traffic Control Devices for Canada. Provide sufficient crushed gravel to ensure a smooth riding surface during work.

.4 Keep travelled way well graded, free of pot holes and of sufficient width that required number of lanes of traffic may pass.

.5 Provide and maintain signs and lights and maintain roadway.

.6 Provide and maintain reasonable road access and egress to property fronting along or in vicinity of work under Contract unless other reasonable means of road access exist.

1.3 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work which may require road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Part D, Temporary Conditions Signs and Devices, of manual titled Uniform Traffic Control Devices for Canada.

.3 Place signs and other devices in locations recommended in said manual.

.4 Meet with Departmental Representative prior to commencement of work to prepare list of signs and other devices required for project.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.4 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag persons, properly equipped as specified in manual of Uniform Traffic Control Devices for Canada, in following situations:

.1 When public traffic is required to pass working vehicles or equipment which may block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 In situations where complete protection for workmen, working equipment and public traffic is not provided by other traffic control devices.

1.5 EXISTING INFORMATIONAL AND WARNING DEVICES

.1 All existing informational and warning devices removed or damaged during the course of the Contractor’s activities are to be replaced in original location and condition by the Contractor at no additional cost..

1.6 OPERATIONAL REQUIREMENTS

.1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified herein and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic may be restricted as follows:

.1 Construction Zones

.1 Lane closed to public traffic when adjacent lane detour provided.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 SUBMITTALS

.1 Contractor to submit Occupational Health and Safety Advance Notice of Project to the Provincial Labour Authority using PWGSC Notice of Project form. An example of the form can be found at the end of this section.

.2 Submit site specific Health and Safety Program: Within 14 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Program 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.

.3 Submit Construction Safety Checklists after completion.

.4 Submit copies of all reports or directives issued by Federal and/or Provincial health and safety inspector(s).

.5 Submit copies of incident and accident reports.

.6 Submit on site Contingency and Emergency Response Plan: Address standard operating procedures to be implemented during emergency situations.

.7 Submit Material Safety Data Sheets (MSDS).

.8 Submit personnel training requirements including names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.

.9 Submit, and post at the Work site, the emergency numbers for police, fire and ambulance for the locale of the Work, as well as the names and after hours numbers for key site personnel related to health, safety or security of the site.

1.2 SAFETY ASSESSMENT

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

.2 Submit hazard assessment report to Departmental Representative.

1.3 MEETINGS

.1 Attend health and safety pre construction meeting.

.2 Arrange for "tool box" safety meetings and submit reports to the Departmental Representative.

1.4 REGULATORY REQUIREMENTS

.1 Comply with specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.

1.5 RESPONSIBILITY

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

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

1.6 COMPLIANCE REQUIREMENTS

.1 Comply with OH&S Legislation.

.2 The contractor shall accept the designation and undertake the obligations of "prime contractor" as defined by clause 2.1 of the Alberta Occupational Health & Safety Act for the work sites of this Contract. To this end, the Contractor must hold a current Certificate of Recognition (C.O.R.) in Health and Safety issued by Alberta Labour, or be actively engaged in meeting the requirements to obtain a C.O. R.

1.7 UNFORSEEN HAZARDS

.1 Should any unforeseen or peculiar safety related factor, hazard, or condition become evident during performance of Work, immediately stop work and follow procedures in place for employee's right to refuse work in accordance with the OH&S Legislation. Advise Departmental Representative verbally and in writing.

1.8 CORRECTION OF NON COMPLIANCE

.1 Immediately address health and safety non compliance issues identified by Departmental Representative or designated safety inspector.

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

.3 Be aware that Departmental Representative may stop Work if non compliance of health and safety regulations is not corrected.

1.9 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.

.2 Stop Work when necessary or advisable for reasons of health and safety.

.3 Be aware that Departmental Representative or designated safety inspector may stop Work when deemed necessary or advisable for reasons of health and safety.

2 Products

Not Used

3 Execution

Not Used

END OF SECTION

1 General

1.1 REQUIREMENTS INCLUDED

.1 Regulations affecting the Work imposed by:

- .1 Occupational Health and Safety
- .2 Canada Border Services Agency
- .3 Public Works Government Services Canada
- .4 Alberta Transportation
- .5 United States - GSAW

1.2 COMPLIANCE WITH REGULATIONS

.1 Ascertain requirements and regulations of authorities listed above.

.2 Comply with all such requirements and regulations as applicable to the Work.

.3 Requirements set out in this Section are for guidance and information and are not necessarily complete.

1.3 PERMITS

.1 Obtain all permits and licences necessary for the Works before Contractor starts work.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 GENERAL

.1 The Contractor is totally responsible for quality of Material and Product which he provides for the Work.

.2 The Contractor is responsible for quality control and shall perform such inspections and tests as are necessary to ensure that the Work conforms to the requirements of the Contract Documents.

.3 During the progress of the Work, a sufficient number of tests shall be performed by the Contractor to determine that material, product, and installation meet the specified requirements.

.4 Minimum requirements regarding quality control are specified in Item 1.2.3 and various sections of the specifications, however, the Contractor shall perform as many inspections and tests as are necessary to ensure that the Work conforms to the requirements of the Contract Documents.

.5 Testing shall be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing Materials (ASTM) and Canadian Standards Association (CSA).

.6 Product testing, mill test and laboratory reports to demonstrate that Product and Material supplied by the Contractor meet the specifications are specified under various sections of the Contract Documents.

1.2 QUALITY CONTROL TESTING BY THE CONTRACTOR

.1 The Contractor shall retain the services of an independent testing agency under supervision of a registered professional Engineer, and pay for the cost of testing services for quality control.

.2 The Contractor shall provide 48 hours advance notice to Departmental Representative for work requiring quality control testing, including but not limited to subgrade review, base gravel inspection, steel dowel placement, concrete pavement pours, and asphalt placement.

.3 Minimum testing includes, but not limited to, the following:

.1 Sieve analysis of sands and aggregates to be supplied to the Work.

.2 Confirmation of subgrade acceptance after excavation of bedrock.

.3 Granular Base Course density compaction testing. Minimum testing every $40m^2$.

.4 Mix designs for hot mix asphalt and portland cement concrete pavements.

.5 A minimum of one asphalt sample is required.

.6 Portland Cement Concrete shall be tested every 20 lineal metres, for a minimum of four test locations. A minimum of four sets of cylinders shall be required, along with four beams for testing.

.7 Any product testing that is required and is specified under various sections of the specifications.

.4 The Contractor shall promptly process and distribute all required copies of test reports and test information and related instructions to all of his Subcontractors and Suppliers to ensure that all necessary retesting and replacement of construction can proceed without delay.

.5 The Contractor shall promptly distribute copies of test reports to the Departmental Representative.

1.3 QUALITY ASSURANCE TESTING BY THE OWNER

.1 The Owner may retain and pay for the services of an independent testing agency for testing for quality assurance, for the Owner's purposes.

.2 The Owner's testing agency and the Departmental Representative may inspect and test Materials, Products and the Work for conformance with the test requirements of the Contract Documents; however, they do not undertake to check the quality of the Work on behalf of the Contractor nor to provide quality control.

.3 Inspections and testing by the Owner's testing agency and by the Departmental Representative do not relieve the Contractor of his responsibility to supply Materials and Products and to perform the Work in accordance with the requirements of the Contract Documents.

.4 The Departmental Representative, at his discretion, may order or perform any additional inspections and testing for purposes of his own, or for purposes of the Owner.

.5 Contractor shall coordinate with the Departmental Representative the scheduling of testing and inspection by the Owner's testing agencies or by the Departmental Representative, to enable testing to be done as necessary, without delay, and the Contractor shall notify Departmental Representative sufficiently in advance of operations to allow for such inspection and test by the Departmental Representative's or the Owner's testing agency.

1.4 TRIAL BATCHING

.1 At the Departmental Representative’s discretion, a Trial Batch of no less than 1.5 cu. m. of concrete shall be produced and tested to confirm adherence to contract specifications. No work shall be permitted on site until the Trial Batching is completed and confirms mix properties adherence to contract specifications.

1.5 CODE COMPLIANCE TESTING

.1 Inspections and tests required by codes or ordinances, or by a plan approval authority, shall be the responsibility of and shall be paid for by the Contractor.

1.6 RETESTING

.1 When tests on Products, Materials, or completed work carried out by the Owner's testing agency yield results not meeting the requirements of the Contract Documents, the Contractor, in addition to carrying out remedial work or replacement of the Product or Materials shall provide for retesting of the remedial work and the Replacement Product and Materials. Retesting shall be at the Contractor's expense, and deducted from his invoice.

.2 In every case where the Contractor has submitted test results which fail to meet the requirements of the Contract Documents, the Contractor shall submit within a practical and reasonable time, results of a retest showing that the results are in accordance with the requirements of the Contract Documents.

2 Products

2.1 NOT USED

.1 Not Used

3 Execution

3.1 NOT USED

.1 Not Used

END OF SECTION

1 General

1.1 INSTALLATION / REMOVAL

.1 Provide temporary utilities, facilities and controls in order to execute the work expeditiously.

.2 Remove from site all such work after use.

.3 Restore site to clean, sanitary condition.

1.2 ENCLOSURES AND BARRICADES

.1 Provide controlled construction access through temporary barriers and enclosures.

.2 Temporary barriers and enclosures as required to protect against injury and damage, including public safety.

.3 Warning lights and safety fencing must be installed around the full site when the contractor is not on site, and must conform to CBSA and US GSAW requirements.

.4 Remove all temporary enclosures and barricades when work is complete.

1.3 DEWATERING AND SITE DRAINAGE

.1 Contractor shall be responsible for the overall site drainage and runoff for the site, or sites, during construction. Contractor will be required to coordinate specific temporary site drainage requirements as required. Contractor to provide and maintain temporary site drainage facilities during construction.

.2 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water at all times during course of construction.

.3 Contractor to become familiar with existing on-site and surrounding drainage patterns, and to incorporate into his temporary drainage facilities and plans.

.4 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

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

.6 Maintain existing drainage facilities affected by Work in good operating condition at all times during construction.

1.4 ACCESS ROADS / TEMPORARY ACCESSES

.1 Adhere to specified requirements for maintenance of public and emergency vehicle access during construction.

.2 Provide and maintain adequate access to Site.

.3 If authorized to use existing roads for access to Site, maintain such roads for duration of Contract and make good damage resulting from contractors' use of roads.

.4 Trim loads of trucks hauling excavated material, cement, sand, stone, gravel, debris or other loose material before leaving the site, an ensure that the bodies of such vehicles are tight so that no spillage of loads occurs. Remove immediate spillage, mud and other debris from haul routes.

.5 Protect all underground structures and utilities including existing power, communications, sanitary, water and storm sewers which are essential services and may be sensitive to additional wheel loading.

.6 Provide and maintain flagpersons, traffic signals, barricades and flares, lights, or lantern as required to perform the work and protect the public.

1.5 MAINTENANCE OF PUBLIC UTILTIIES

.1 Arrange Work to avoid interruption of utilities serving the public. Pay for damage.

.2 Where interruption of public utilities is unavoidable, obtain prior approval for interruption from responsible authority.

.3 Do not obstruct hydrants, valve or control pit covers, valve boxes, curb stop boxes, fire or police call boxes, and all other utility controls, warning systems, and appurtenances.

1.6 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage.

.2 Be responsible for damage incurred.

.3 Protect trees and plants on site and adjacent properties.

1.7 SITE SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary fencing as means to maintain security for the work site.

.2 Assume full responsibility for protection and safe keeping of work, products stored on site, temporary buildings and equipment.

.3 Engage a watchman if necessary to prevent damage when site is unoccupied.

.4 Any work and materials damaged by failure to provide protection shall be removed and replaced with new work at Contractor's expense.

1.8 SANITARY FACILITIES

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

.2 Post notices and take such precautions as required by local health authorities.

.3 Keep area and premises in sanitary condition.

1.9 PROJECT CLEANLINESS

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

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

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

.4 Surplus or rejected concrete is to be disposed of off site at an approved manner.

1.10 CONSTRUCTION PARKING

.1 Observe parking regulations on public roadways.

.2 Maintain and administer parking for own forces and those of subcontractors in the designated areas.

END OF SECTION

1 General

1.1 PREPARATION

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

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

.3 Provide devices and methods to protect other portions of project from damage.

.4 Provide protection from elements for areas which may be exposed by uncovering work.

.5 Maintain excavations free of water.

1.2 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.3 WORKMANSHIP

.1 General:

.1 Execute work by workers experienced and skilled in the respective duties for which they are employed. Notify Departmental Representative immediately if required Work is such as to make it impractical to produce required results.

.2 Do not employ any unfit person or anyone unskilled in their required duties. Departmental Representative reserves the right to require the dismissal from the site, of workers deemed incompetent, careless, insubordinate or otherwise objectionable.

.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with Departmental Representative, whose decision is final.

.2 Co-Ordination:

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for co-ordination and placement of openings, sleeves and accessories.

.3 Protection of Work in Progress:

.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by Departmental Representative, at no increase in Contract Amount.

.4 Remedial Work:

.1 Perform remedial work required to repair or replace the parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with the materials affected. Perform in a manner to neither damage nor endanger any portion of Work.

.5 Location of Fixtures:

.1 Inform Departmental Representative of a conflicting installation. Install as directed.

1.4 EXISTING UTILITIES

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

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

2 Products

Not Used

3 Execution

Not Used

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Substantial Completion Inspection: Contractor to provide 48 hours notice to Consultant for substantial completion inspection.

.2 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Final Inspection:

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

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

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

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

1.2 AS -BUILT DOCUMENTS AND SAMPLES

.1 Submit to Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

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

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

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

.1 Do not use record documents for construction purposes.

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

1.3 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information concurrently with construction progress.

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

.2 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.

.3 Other Documents: maintain field test records, required by individual specifications sections.

1.4 FINAL SURVEY

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

1.5 FINAL CLEANING

.1 Remove all surplus materials, excess materials, rubbish, tools and equipment from site.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Site Meetings.

.1 Convene pre-demolition meeting one week prior to beginning work of this Section in accordance with Section 01 31 19 – Project Meetings and Schedules to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Storage and Protection.

.1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative .

.2 Remove and store materials to be salvaged, in manner to prevent damage.

.3 Store and protect in accordance with requirements for maximum preservation of material.

.4 Handle salvaged materials as new materials.

1.3 SITE CONDITIONS

.1 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.2 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout the project.

.3 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with as directed by Departmental Representative.

.5 Protect trees, plants and foliage on site and adjacent properties where indicated.

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

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

.8 Notify and obtain approval of utility companies before starting demolition.

.9 Protection of In-Place Conditions:

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

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

.3 Protect building systems, services and equipment.

Part 2 Products

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 Execution

3.1 PREPARATION

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

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

3.2 REMOVAL OPERATIONS

.1 Remove items as indicated.

.2 Do not disturb items designated to remain in place.

.3 Removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.4 Disposal of Material:

.1 Dispose of materials not designated for salvage or reuse off site.

3.3 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

3.4 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.5 CLEANING

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

.2 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

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

3.6 PROTECTION

.1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

1 General

1.1 SAMPLES

.1 Allow continual sampling by Departmental Representative during production.

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

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

2 Products

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Natural sand.

.2 Manufactured sand.

.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

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

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling as required.

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

.3 Advise Departmental Representative in advance of proposed change of material source.

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

3 Execution

3.1 PREPARATION

.1 Processing

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

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.

.3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.

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

.2 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Stockpiling – (if required)

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 h of rejection.

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

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

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

.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

END OF SECTION

1 General

1.1 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and stockpile aggregates in accordance with Section 310516 - Aggregates: General.

2 Products

2.1 MATERIALS

.1 Granular base: material to Section 310516 - Aggregates: General and following requirements:

.1 Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSBD-8-GP-2M.

.1 Gradation to:

Sieve Designation	%Passing
25 mm	100
16 mm	73-94
10 mm	56-80
5 mm	40-66
1.250 mm	24-45
0.315 mm	13-27
0.160 mm	9-19
0.080 mm	4-10

.3 Liquid limit: to ASTM D4318, maximum 25

.4 Plasticity index: to ASTM D4318, maximum 6

.5 Los Angeles degradation: to ASTM C131. Max. % loss by weight: 45

.6 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least 2 freshly fractured faces. Material to be divided into ranges using methods of ASTM C136.

Passing		Retained on
25 mm	to	19.0 mm
19.0 mm	to	4.75 mm

.7 Soaked CBR: to ASTM D1883, min 80, when compacted to 100% of ASTM D698

3 Execution

3.1 PREPARATION

.1 The sub-grade shall be prepared according to cross-sections shown on drawings. The Contractor shall maintain the sub-grade to the specified section, free from ruts, waves and undulations until granular sub-base material is placed. The sub-grade shall be in a firm dry condition and must be approved by the Departmental Representative before gravel is placed. The depositing of granular base or sub-base on a soft, muddy or rutted sub-grade will not be permitted.

3.2 PLACING

.1 Place material only on a clean unfrozen surface, properly shaped and compacted and free from snow and ice.

.2 Place using methods which do not lead to segregation or degradation of Aggregate. Use approved methods to create uniform windrow of material along a crown line or high side of a one-way slope.

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

.4 Shape each layer to a smooth contour and compact to the specified density before a succeeding layer is placed.

.5 Remove and replace any portion of a layer in which material becomes segregated during compaction.

3.3 COMPACTING

.1 Moisture condition of granular sub-base coarse materials to be within plus or minus 3 percent of the optimum moisture content of the material.

.2 Compact to density not less than 100% of corrected maximum dry density in accordance with ASTM D698 (Method C or D).

.3 Shape and compact alternately to obtain a smooth, even and uniformly compacted base.

.4 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.

3.4 FINISH TOLERANCES

.1 Finished sub-base and base surfaces shall be within plus or minus 10 mm of established grade, but not uniformly high or low.

.2 Correct surface irregularities by loosening and adding or removing materials until surface is within the specified tolerances.

3.5 MAINTENANCE

.1 Maintain finished base in a condition conforming to this section until succeeding material is applied or until acceptance.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Not Used

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 EXCAVATION

.1 Excavate subgrade to line and grade as shown on the contract drawings or as directed by Departmental Representative.

.2 Remove all loose broken clipped weathered bedrock to expose clean uniform undisturbed surface.

.3 Sweep subgrade surface prior to granular base install.

.4 Finished subgrade surface to be inspected by a qualified geotechnical engineer to confirm bearing strength matches correctly with design assumptions.

3.2 SITE TOLERANCES

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

3.3 CLEANING

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

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

3.4 PROTECTION

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO M081-92-UL, Standard Specification for Cutback Asphalt (Rapid-Curing Type).

.2 ASTM International

.1 ASTM D140/D140M, Standard Practice for Sampling Bituminous Materials.

.2 ASTM D633, Standard Volume Correction Table for Road Tar.

.3 ASTM D1250, Standard Guide for Use of the Petroleum Measurement Tables.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-16.2M, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.2 APPROVED EQUIVALENT

.1 City of Lethbridge Construction Specifications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 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.

Part 2 Products

2.1 MATERIALS

.1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: 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 $L/m^2$with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m^2.

.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 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt approval to proceed from Departmental Representative.

3.2 APPLICATION

.1 Apply asphalt tack coat only on clean and dry surface.

.2 Dilute asphalt emulsion with water at a ratio recommended by the supplier.

.1 Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply asphalt tack coat evenly to pavement surface at rate as directed by Departmental Representative, not to exceed 0.5 L/m^2.

.4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.5 Apply asphalt tack coat only when air temperature greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.

.6 Apply asphalt tack coat only on unfrozen surface.

.7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.8 Keep traffic off tacked areas until asphalt tack coat has set.

.9 Re-tack contaminated or disturbed areas as directed by Departmental Representative.

.10 Permit asphalt tack coat to set [break] before placing asphalt pavement.

.11 Inspect tack coat application to ensure uniformity.

.1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by Departmental Representative.

.2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

3.3 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM D140/D140M, Standard Practice for Sampling Bituminous Materials.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-16.2-M, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.2 APPROVED EQUIVALENT

.1 City of Lethbridge Construction Specifications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

Part 2 Products

2.1 MATERIAL

.1 Asphalt material: to CAN/CGSB-16.2 grade: SS-1.

.2 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.

.3 Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

.1 Pressure distributor:

.1 Designed, equipped, maintained and operated so that asphalt material can be:

.1 Maintained at even temperature.

.2 Applied uniformly on variable widths of surface up to 5 m.

.3 Applied at controlled rates from 0.2 to 5.4 L/$m^2$with uniform pressure, and allowable variation from any specified rate not exceeding 0.1 L/m^2.

.4 Distributed in uniform spray without atomization at temperature required.

.2 Equipped with meter registering travel distance in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator.

.1 Pump power unit to be independent of truck power unit.

.4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.

.1 Temperature to be measured to nearest whole number.

.5 Equipped with accurate volume measuring device or calibrated tank.

.6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

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 prime coat installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt approval to proceed from Departmental Representative.

3.2 APPLICATION

.1 Proceed with application of prime coat only after receipt of written approval of granular base surface from Departmental Representative.

.2 Anionic emulsified asphalt:

.1 Dilute asphalt emulsion with clean water at 2:1 ratio for application.

.2 Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply diluted asphalt emulsion at rate of $2L/m^2$ or as directed by Departmental Representative, and recommended by the manufacturer.

.4 Apply diluted asphalt emulsion on damp surface unless otherwise directed by Departmental Representative.

.3 Apply asphalt prime only on unfrozen surface.

.4 Apply asphalt tack coat only when air temperature is greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.

.5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt prime material.

.6 Where traffic is to be maintained, treat no more than one-half width of surface in one application.

.7 Prevent overlap at junction of applications.

.8 Do not prime surfaces that will be visible when paving is complete.

.9 Apply additional material to areas not sufficiently covered as directed by Departmental Representative.

.10 Keep traffic off primed areas until asphalt prime has cured.

.11 Permit prime to cure for 24 hours before placing asphalt paving.

3.3 USE OF SAND BLOTTER

.1 If asphalt prime fails to penetrate within 24 hours, spread sand blotter material in amounts required to absorb excess material.

.2 Allow sufficient time for excess prime to be absorbed as directed by Departmental Representative.

.3 Apply second application of sand blotter as required.

.4 Do not roll blotter sand.

.5 Sweep and remove excess blotter material.

3.4 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 At the request of the Departmental Representative:

.1 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Fural viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175°C prior to commencing work.

.2 Submit manufacturer's test data and certification that asphalt cement meets requirements of this section.

.3 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review prior to commencing work.

.4 The Contractor shall retain and pay for an independent testing Departmental Representative to perform all materials, certification tests, and mix designs required in this section.

1.2 SAMPLES

.1 Inform Departmental Representative of proposed source of aggregates and, as required, provide access for sampling at least 4 weeks prior to commencing work.

.2 At the request of the Departmental Representative, submit samples of following materials proposed for use prior to commencing work:

.1 One 5 L container of asphalt cement.

.2 Identify name and supplier of asphalt cement.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver and stockpile aggregates in accordance with Section 31 05 16 – Aggregates: General. Stockpile minimum 50% of total amount of aggregate required before commencing asphalt mixing operation.

.2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.3 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles fro more than two mix components are permitted.

.4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

.5 At the request of the Departmental Representative, submit copies of freight and waybills for asphalt cement as shipments are received. Departmental Representative reserves right to check weights as material is received.

Part 2 Products

2.1 MATERIALS

.1 Performance graded asphalt cement: to AASHTO M320, grade PG 58—31.

.2 Aggregates:

.1 To all requirements specified in Section 31 05 16 – Aggregates: General.

.2 Coarse aggregate is aggregate retained 5,000 sieve, fine aggregate is aggregate passing 5,000 sieve.

.3 Aggregate material shall be crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and any other deleterious materials.

.4 Gradations to be within limits specified when tested to ASTM C-136 and ASTM C-117 with sieve sizes to CAN/CGSB 8-GP-2M rather than ASTM E11.

.5 Aggregate from source shall be processed to meet the following requirements:

.1 Natural fines pre-screened and stockpiled with not more than ten 910) percent of material retained on 5,000 sieve and one hundred (100) percent passing 10,000 sieve.

.2 Pre-screened aggregate delivered to crushing plant shall contain not more than ten (10) percent passing 5,000 sieve.

.3 Crusher run shall be separated and stockpiled in accordance with the following:

.1 Coarse aggregate to contain not more than ten (10) percent of material passing the 5,000 sieve. Fine aggregate to contain not more than fifteen (15) percent of material retained on the 5,000 sieve.

.6 Physical Properties for Aggregates

		ASTM	**MIX TYPE**
REQUIREMENT		**METHOD**	**I**
Sand Equivalent (Mech. Method)		D2419	45 min.
Fine Aggregate Angularity		C1252	45 min.
Magnesium Sulphate Soundness			
(% Loss)	*Coarse Aggregate*:	C88	12 max.
	Fine Aggregate:	C88	12 max.
Los Angeles Abrasion			
Gradation B% Loss		C131	32 max.
Lightweight Particles % by Mass		C123	1.5 max.
Flat & Elongated Particles (length to thickness ratio greater than 5), %			15 max.
Crushed Particles (2 faces, plus 5,000 sieve fraction), %			80 min.

.7 Blend Sand:

.1 To consist of natural or manufactured sand passing 5,000 sieve.

.2 Shall be uniformly graded, with no individual sieve analysis varying from the running stockpile average by more than:

315 sieve and coarser – 5% max.
160 & 80 sieves – 2% max.

.3 Stockpile volumes shall be maintained to ensure a minimum 10,000-t of plant mix production at all times.

.4 Incorporate into plant by separate calibrated mechanical feeders.

.8 Mineral Filler:

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other non-plastic mineral matter, thoroughly dry and free from lumps.

.2 Add mineral filler when necessary to meet job mix aggregate gradation.

.9 Gradation of Combined Aggregates:

COMBINED AGGREGATES - % PASSING

SIEVE SIZE	MIX TYPE
	I
25,000	
20,000	
16,000	100
12,500	85 – 95
10,000	70 – 85
5,000	50 – 65
2,500	40 – 50
1,250	30 – 40
630	20 – 30
315	15 – 23
160	9 – 16
80	4 – 8

.10 Combining of Aggregates:

.1 Coarse aggregate, manufactured sand, natural sand as well as blend sand and mineral filler, if required, to be fed to plant through calibrated mechanical feeders.

.2 Of total sand fraction (passing 5,000 sieve) manufactured sand shall be, by mass:

.1 Type I (surface course) mix – 75%

.2 Type II (base course) mix – 65%

.3 Submit design cold feeder blend of aggregates to the Departmental Representative with mix design.

.4 Gradation of aggregates when blended to job mix formula to be within limits specified herein and giving a smooth curve without sharp breaks when plotted on semi-log grading chart.

2.2 MIX DESIGN (TYPE I)

.1 The Contractor shall retain an independent testing Departmental Representative to perform trial mix designs and to submit a design mix to the Departmental Representative. The trial mix shall be performed in accordance with ASTM D1559 and shall include five (5) separate trial values of asphalt content.

.2 Contractor shall pay for trial mix designs and submissions.

.3 Include the following data with the trial mix design submission:

.1 Aggregate specific gravity and absorption.

.2 Sand equivalent values.

.3 Asphalt cement properties including mixing and compaction temperatures, based on temperature – viscosity properties of asphalt cement.

.4 Aggregate gradation and blending proportions.

.5 Maximum theoretical density of trial mixes.

.4 Design of Mix:

.1 **TYPE I** and **TYPE II** – By Marshall method, 75 Blows on each face of test specimens using mechanical compactor.

.2 **TYPE III** – By Marshall method, 50 Blows on each face of test specimens using mechanical compactor.

.5 Mix Physical Properties

	MIX TYPE
PROPERTY	**I**
Marshall Stability @ 60 C; kN	10.0 min.
Marshall Flow @ 60 C; 0.25 mm Units	8 – 14
Voids in Mineral Aggregate, %	13.5 – 15.0

PROPERTY	**I**
Air Voids in Mixture, %	
Design Range:	3 – 5
At Design % AC	4.0 $\pm$ 0.2
Asphalt Film Thickness, um	6.5 – 8.0

Note: .1 Percent air voids in compacted trial mixes shall be determined in accordance with ASTM D3203, with asphalt cement absorbed into the aggregate compensated for in the calculation.

.2 Air Voids in Mixture: the approved design shall have asphalt content to produce specified air voids; plant production tolerances shall be in accordance with design range limits.

.3 Film thickness calculation to be performed as specified in the following section.

.6 Film Thickness Determination: determine asphalt film thickness as follows:

.1 Surface Area Factors (Sa):

SIEVE SIZE (um)	**SURFACE AREA (m^2 /kg)**
+ 5,000	0.39
2,500	0.78
1,250	1.60
630	2.75
315	5.90
160	11.00
80	30.00

Determine total surface area as the sum of the surface areas for the seven specified sieve sizes in accordance with the formula:

$$/SA = \frac{\% \text{ Passing} \times \text{Surface Area Factor}}{100}$$

.2 Corrected Sa: Correct Sa for actual aggregate bulk specific gravity by the following formula:

Corrected Sa (Sac) = Sa (2.650/actual bulk specific gravity)

.3 Film Thickness (Ft) Calculation: For the calculation of the film thickness (Ft) require the following information:

.1 Pac = percent asphalt cement content by dry weight of aggregate.

.2 Pabs = Percent of absorb asphalt cement by dry weight of aggregate.

.3 SGac = specific gravity of the asphalt cement.

.4 Sac = corrected Sa.

With this data the Ft is calculated with the following formula:

$$Ft = \frac{10 (Pac - Pabs)}{Sac \times SGac}$$

Part 3 Execution

3.1 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. 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 a lesser moisture content if required to meet mix design requirements.

.6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.7 Store hot screened aggregates in manner to minimize segregation and temperature loss.

.8 Heat asphalt cement and aggregate to mixing temperature directed by Departmental Representative. Do not heat asphalt cement above 160°C .

.9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to review temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.10 Maintain temperature of materials within 10°C of specified mix temperature during mixing.

.11 Mixing time:

.1 In batch plants, both dry and wet mixing times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30 s or more than 75 s.

.2 In continuous mixing plants, mixing time as directed by Departmental Representative, but not less than 45 s.

.3 Do not alter mixing time unless directed by Departmental Representative.

.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 Meter total flow of aggregate by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate , and asphalt entering mixer remain constant.

.5 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.

.6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.

.7 Make provision for conveniently sampling full flow of materials from cold feed.

.8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.

.9 Provide system interlock stop all feed components if either asphalt or aggregate from any bin stops flowing.

.10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. 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. Submit printed record of mix temperatures at end of each day.

.11 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than .2%.

.3 Temporary storage of hot mix:

.1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.

.2 Do not store asphalt mix in storage bins in excess of 3 h.

.4 Mixing tolerances:

.1 Permissible variation in aggregate gradation from job mix (percent of total mass):

5.0 mm sieve and larger	5.0
2.50 mm sieve	4.0
0.315 mm sieve	3.0
0.160 mm sieve	2.0
0.080 mm sieve	1.5

.2 Permissible variation of asphalt cement from job mix: 0.30%.

.3 Permissible variation of mix temperature at discharge from plant: 10°C.

3.2 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 Minimum drum diameter: 1200 mm.

.2 Maximum amplitude of vibration (machine setting): 0.5 mm 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 not less than 12 kg and bearing area not exceeding 310 cm^2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative may be used instead of tamping irons.

.3 Straight edges, 4.5 m in length, to test finished surface.

3.3 PREPARATION

.1 When paving over existing asphalt surface, clean pavement surface. When levelling course is not required, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.

.2 Apply prime coat and tack coat in accordance with Section 32 12 13.23 - Asphalt Prime and Section 32 12 13.16 - Asphalt Tack Coat prior to paving.

.3 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. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.

.3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.

.4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. 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. Deliver and place mixes at temperature within range as directed by Departmental Representative , but not less than 135°C.

3.5 PLACING

.1 Obtain Departmental Representative's approval of base and existing surface and tack coat and prime coat prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines as directed by Departmental Representative.

.3 Placing conditions:

.1 Place asphalt mixtures only when air temperature is above 5°C.

.2 When temperature of surface on which material is to be placed falls below 10°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 As indicated on drawings for specific location for structural thickness to be 60 mm asphalt concrete.

.2 As required, but not to exceed 75 mm for levelling courses.

.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.

.6 Spread and strike off mixture with self-propelled mechanical finisher.

.1 Construct longitudinal joints and edges true to line markings. Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.

.2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.

.3 Maintain constant head of mix in auger chamber of paver during placing.

.4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

.5 Correct irregularities in alignment left by paver by trimming directly behind machine.

.6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.

.7 Do not throw surplus material on freshly screeded surfaces.

.7 When hand spreading is used:

.1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

.2 Distribute material uniformly. Do not broadcast material.

.3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. 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. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

3.6 COMPACTING

.1 Roll asphalt continuously to a density of 98% SPD.

.2 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.

.3 Roll Type I, Type II, and Type III asphalt continuously to density as specified herein.

.4 General:

.1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.

.2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.

.3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.

.4 Use static compaction for levelling coarse less than 25 mm thick.

.5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.

.6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.

.7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

.8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

.9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.

.10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. 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 Commence breakdown rolling with static steel wheeled roller immediately following rolling of transverse and longitudinal joint and edges.

.2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.

.3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.

.4 Use only experienced roller operators.

.6 Intermediate rolling:

.1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.

.2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.7 Finish rolling:

.1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.

.2 Conduct rolling operations in close sequence.

3.7 JOINTS

.1 General:

.1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.

.2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.

.3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:

.1 Offset transverse joint in succeeding lifts by at least 600 mm.

.2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.

.3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

.3 Longitudinal joints:

.1 Offset longitudinal joints in succeeding lifts by at least 150 mm.

.2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100°C prior to paving of adjacent lane.

.1 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.

.3 Overlap previously laid strip with spreader by 25 to 50 mm.

.4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

.5 Roll longitudinal joints directly behind paving operation.

.6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

.4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Location of feather joints as indicated.

.5 Construct butt joints as indicated.

3.8 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.

3.9 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. 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.

3.10 EQUAVALENT PRODUCT

.1 City of Lethbridge Type I Asphalt Concrete is an approved alternate product.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.2 ASTM C171, Standard Specification for Sheet Materials for Curing Concrete.

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

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

.5 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.

.6 ASTM C666/C666M-03, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

.7 ASTM D1752-04a, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.8 ASTM D3569-95, Standard Specification for Joint Sealant, Hot-Applied, Elastomeric, Jet-Fuel-Resistant Type for Portland Cement Concrete Pavements.

.9 ASTM D5329-09, Standard Test Methods for Sealants and Fillers, Hot-Applied, For Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.

.10 ASTM D6690 -12, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

.2 CSA Group

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

.2 CSA-A3000-13, Cementitious Materials Compendium.

.3 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Submit following sampling and testing data:

.1 Sieve analysis for gradation of bedding material.

.2 At least 4 weeks prior to beginning Work, provide Departmental Representative with samples of materials proposed for use as follows:

.1 5 L of curing compound.

.2 1m length of each type of joint filler.

1.3 QUALITY CONTROL

.1 Qualifications:

.1 Provide Departmental Representative, minimum 4 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.

.2 Installer: Company or person specializing Portland cement concrete paving approved by manufacturer with documented experience.

.2 Certifications:

.1 Submit to Departmental Representative manufacturer's test data and certification that following material meets criteria and requirements of this section prior to starting concrete work:

.1 Portland Cement.

.2 Blended Hydraulic Cement.

.3 Supplementary Cementing Material.

.4 Admixtures.

.5 Joint Sealants.

.6 Curing Materials.

.7 Joint Filler.

.2 Submit certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA A23.1/A23.2, and that mix design is adjusted to prevent alkali aggregate reactivity problems.

.1 Departmental Representative may require test batching to confirm plant certification.

.3 Testing:

.1 Contractor shall retain independent testing agency.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Coordinate delivery and storage of materials to site with Departmental Representative .

.1 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Mix design requirements:

.1 Submit concrete mix design to Departmental Representative for review 4 weeks prior to commencing work.

2.2 MATERIALS

.1 Portland cement: to CSA A3000.

.2 Aggregates: to CSA A23.1/A23.2 and to following requirements:

.1 Coarse aggregate:

.1 Produce coarse aggregate in at least two separate sizes which, when combined, yields gradation specified. Each component size to form approximately equal percentage of total coarse aggregate.

.2 Gradation: to CSA A23.1/A23.2, table 5, nominal size 28-5.

.3 Flat and elongated particles: to CSA A23.1/A23.2 (13A) (length to width and width to thickness ratio greater than 3) not to exceed 0.5% by mass.

.2 Fine aggregate:

.1 Gradation: to CSA A23.1/A23.2, Table 1. Material passing 0.160 mm sieve: maximum 5%.

.2 Aggregates for use in concrete pavement shall not be susceptible to D-cracking. Unless field experience, aggregate history or prior laboratory testing have proven otherwise.

.3 Aggregates for use in concrete pavement shall be tested in accordance with ASTM C666/C666M. Test shall be in accordance with Procedure A for a period of 350 cycles.

.3 Supplementary cementing materials: to CSA A3000.

.4 Air entraining admixture: to ASTM C260/C260M.

.5 Chemical admixtures: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Curing compound: to ASTM C309, Type 1-D or 2.

.7 Burlap mats for curing: to ASTM C171.

.8 Joint sealant, hot poured. Bond breaker to Departmental Representative's approval.

.9 Dowels: to CSA G30.18.

.1 Dowels: clean, straight and free from flattened or burred ends, plain round bars of grade 300 or better conforming to CSA G40.20/G40.21 and be epoxy-coated to ASTM A775/A775M.

.10 Protective covers and insulation for cold weather concreting: to CSA A23.1/A23.2.

2.3 MIXES

.1 Job mix formula to be approved by Departmental Representative in accordance with Alternative 1 of CSA A23.1/A23.2, Table 13 and as specified below.

.2 For concrete proportioned in accordance with Alternative 1:

.1 Use type HS cement.

.2 Flexural strength when tested in accordance with CSA A23.1/A23.2,: average 28 day flexural strength to be minimum 4.0 MPa. (compressive strength 40MPa.)

.3 Air content when tested in accordance with CSA A23.1/A23.2, (4C), immediately after discharge: in accordance with CSA A23.1/A23.2, Table 10.

.4 Class of exposure: Class C-2.

.5 Silica Fume or other add mixture as required to meet material properties.

.3 Proposed changes in material source to be approved by Departmental Representative New mix design to be approved by Departmental Representative.

.4 Contractor to carry out a minimum of two 7 day strength tests.

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 concrete paving installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of[Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after approval to proceed from Departmental Representative.

.2 Provide Departmental Representative with 24 hours minimum advance notice of placing concrete.

3.2 EQUIPMENT

.1 Concrete plant: in accordance with CSA A23.1/A23.2.

.2 Use following equipment on approval of Departmental Representative :

.1 Hand operated transverse screeds spanning side forms.

.2 Mechanically powered vibrating beam spanning side forms.

.3 Hand operated floats and fluting tools used by skilled workers.

.3 Provide following miscellaneous equipment where required:

.1 Edging tool.

.2 Water truck equipped with pump, hose line and fine spray nozzle.

.3 Self-propelled automatic spray machine spanning fresh concrete, equipped with fine spray nozzles suitable for application of membrane curing compound uniformly over surface and exposed edges, and with wind skirt to permit proper application during windy conditions.

.4 Self-propelled concrete saws equipped with rubber-tired wheels, readily adjustable blade depth controls, and sawing line guide pointers both front and rear. Provide adequate number of units to complete sawing at rate required and have ample supply of suitable saw blades and at least one standby sawing unit available on job site before concrete placement is started.

.5 Heating kettle or tank for heating sealing compound:

.1 Double boiler with space between inner and outer shells filled with oil, asphalt or other material for heat transfer.

.2 Equip for positive temperature control of sealing compound.

.3 Equip with readily calibrated device which accurately registers temperature of sealing compound.

3.3 FORMWORK

.1 Install in accordance with the following requirements:

.1 For fixed form paving:

.1 Provide forms of sufficient strength to support and keep alignment under weight of spreading and finishing machines.

.2 Use of wood forms to be approved by Departmental Representative.

.3 Set forms true to line and grade, join neatly and tightly and stake securely to resist concrete pressure and impact from tampers without springing.

.4 Clean and oil forms before each use.

.5 Obtain Departmental Representative's approval of forms before placing concrete.

.2 For slip form paving:

.1 Provide sufficient length of slip form trailing behind paver to prevent slumping at slab edge. Ensure rigid lateral support.

.2 Set grade and line for laser equipment or control string or wire from line and grade established by Departmental Representative.

3.4 SUBGRADE AND SUBBASE PREPARATION

.1 Soft, yielding materials or other portions of subgrade that will not compact to specification shall be removed and replaced with suitable material. Subgrade to be brought to a firm unyielding condition with a uniform density. It shall be compacted at or above optimum moisture content to 100% Standard Proctor Maximum Dry Density (ASTM Test Method D698).

.2 Subbase to consist of specified material and have a compacted thickness of not less than specified.

.3 For slip-form paving, subbase travelled by tracks in paving machine shall be firm and have a smooth surface.

.4 Subbase shall be compacted to specified density.

.5 Prepared subbase shall be checked for conformity with the cross-section and grad tolerances. Finished surface of subbase shall not deviate more than 0 mm above and 20 mm below specified grade and cross-section, and surface shall not deviate more than 10 mm at any place on a 3mm template.

.6 Repair damage to subbase resulting from hauling or equipment operations.

.7 Prior to placing concrete, subbase shall be thoroughly wetted. Wetting shall be carried out, such that standing water is not present on grade.

.8 Surface condition of base to be approved by Departmental Representative before placing concrete.

3.5 REINFORCING STEEL AND DOWELS

.1 Dowel bars shall be plain round bars of grade 300 or better conforming to CSA G40.20/G40.21 and be epoxy-coated to requirements of ASTM A775/A775M.

.2 Reinforcing dowels to be 32mm diameter by 450mm in length, spaced at 300mm, placed at mid-depth within the slab. Dowels to be placed using prefabricated dowel baskets to ensure they are oriented perpendicular to the joint and parallel to the pavement surface.

.3 Place sufficient number of joint dowel assemblies in advance of paver to avoid delay in concrete placement.

.4 Remove oil, grease, dirt and deleterious material from reinforcing bars before placing concrete.

.5 Steel placement to be approved by Departmental Representative before placing concrete.

.6 1.5m end thickening of 20%.

3.6 PLANT AND MIXING REQUIREMENTS

.1 If crusher screenings are approved as mixture component, proportion separately from sand.

.2 If washing of aggregate required, allow aggregate to drain for 24 hours or longer as required to stabilize moisture content.

.3 For truck mixers, mixing to be in accordance with CSA A23.1/A23.2.

.4 Mix produced to be within following tolerances from mix design:

.1 Air content: as per CSA A23.1/A23.2, Table 10.

3.7 TRANSPORT AND DELIVERY OF MIX

.1 Time from initial mixing to final placing to be not more than 120 minutes if mix is transported by agitating equipment (e.g. truck mixer) in accordance with CSA A23.1/A23.2, clause 18.4.2 - Delivery with Agitating Equipment, unless approved otherwise by Departmental Representative.

3.8 PLACING

.1 Place concrete to lines, grades and depths as indicated.

.2 Discharge concrete into forms as soon as practical after mixing.

.3 Use hand placing where machine spreading is not feasible.

.4 Spread uniformly with approved equipment to thickness sufficient to allow for proper consolidation and finishing. Do not apply external tractive force to paver.

.5 Operate with continuous forward momentum. Schedule concrete supply to minimize interruptions.

.6 When completing concrete placement for day, carry placement through to scheduled contraction joint location.

.7 Where concrete placement is stopped for more than 30 min due to breakdowns, weather or other reasons, construct extra bulkhead and construction joint as directed by Departmental Representative.

.8 Do not place concrete on frozen surface.

.9 No concrete shall be placed during rain.

.10 When rain appears imminent paving operation should cease. Protect freshly laid concrete from rain damage and adverse weather condition and in accordance with CSA A23.1/A23.2. Extend protective coverings over edges of concrete and arrange so as not to bear on unprotected edges.

.11 Concrete placed when the ambient temperature is at or above 27 degrees C to be cured by continuous water curing from soaker hoses with burlap mats providing complete coverage of the pavement to minimize the temperature rise of the concrete.

.12 When concrete has been placed in cold weather and the sire temperature is expected to drop below 5 degrees C, insulating curing blankets or other suitable material shall be placed on the concrete pavement and weighted to prevent movement. Curing to continue until the cumulative number of days, or fraction thereof, during which the temperature of the concrete is above 10 degrees C, has totalled a minimum of 7 days. Alternatively, if compressive tests of cylinders cured under field conditions achieve at least 70% of the specified compressive strength, curing may be discontinued.

.13 Concrete pavement placed in cool weather shall experience a minimum of 30 day air-drying period, following final curing, before first application of de-icing salts.

3.9 CONSOLIDATION

.1 When internal vibrators are used:

.1 For slab depths greater than 50 mm, mount vibrators with tips minimum 50 mm above base and tops minimum 50 mm beneath pavement surface.

.2 Operate at manufacturer's recommended number of vibrations and specifications.

.3 Treat each pavement section to at least 2 passes of vibratory equipment unless otherwise directed by Departmental Representative.

.2 Stop vibrators when paver stops.

.3 Use hand operated vibrator on odd shaped slabs inaccessible to frame mounted units. Do not operate vibrator in one location longer than 5 seconds.

.4 Ensure concrete adjacent to edge forms or previously constructed slabs is thoroughly vibrated.

3.10 FINISHING

.1 After consolidation by vibration, finish with equipment approved by Departmental Representative.

.2 When striking off concrete surface, maintain uniform roll of concrete ahead of first screed for its full length when finishing machine is on first pass.

.3 Make 2 passes with transverse finishing machine.

.4 Where joints are formed rather than sawn, form longitudinal and transverse joints after final pass of finishing machine.

.5 Hand finish areas inaccessible to finishing machines to same quality and surface characteristics as machine finished surfaces.

.6 Finish concrete surface with approved float at proper time. Operate from edge to edge with wiping motion while advancing, with each succeeding pass overlapping previous one.

.7 Check surface with approved 3.5 m long straightedge. Correct irregularities exceeding 5mm before concrete takes initial set.

.8 Finish edges of slabs with edging tool to form smooth squared surface. Do not patch with cement paste.

3.11 SURFACE TEXTURING

.1 Commence texturing immediately after float finishing.

.2 Use stiff bristled broom to produce nonslip concrete surface finish approved by Departmental Representative, with fine granular texture free from disfigurations.

.3 Provide transverse grooves to within 75mm of the edge of the concrete surface. Texturing to be straight, precise and not damaging to pavement edges.

3.12 CURING

.1 Cure for minimum 7 days by following method:

.1 Curing compound:

.1 Apply in two coats with approved spray equipment to form complete and unbroken film on surface of concrete. Mechanically agitate compound before and during use.

.2 For hand application apply first coat immediately after texturing operations, second coat to be applied immediately after first coat in a perpendicular direction.

.3 For machine application curing compound to be applied in accordance with manufacturers' specifications.

.4 Apply second in accordance with manufacturer's instructions.

.5 Apply each spray at application rate recommended by manufacturer.

.6 Spray slab edges immediately after removal of forms.

.7 Protect formed or sawed joints from evaporation during curing period.

.8 Respray areas where membrane is damaged during curing period.

.2 Burlap or cotton mats:

.1 As soon as concrete surface has been finished and can bear weight without marking, carefully cover with burlap or cotton mats.

.2 Place mats to overlap each other by 300 mm or more and to overlap concrete slab by 300 mm or more at each side secured by a continuous bank of sand and gravel.

.3 Cover sides and ends of slab with mats as soon as forms are removed.

.4 Thoroughly wet mats before placing them on concrete and keep saturated during curing period with water spray sufficiently fine to avoid damaging concrete surface, avoiding wet/dry cycles.

3.13 TOLERANCES

.1 Finished concrete surface to be within 5 mm of design grade but not uniformly high or low.

.2 Finished concrete surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

.3 Horizontal deviations of slab edge from alignment of pavement not to exceed 10 mm.

3.14 JOINTS

.1 General:

.1 Construct joints plumb, straight and square to details indicated.

.2 Install isolation joints around structures and features that project through, into or against pavement.

.2 For sawn joints.

.1 Ensure joints are sawn straight. Install end stakes to ensure straight joint alignment across paved area. Mark joint alignment with chalk line or other suitable guide to approval of Departmental Representative.

.2 Saw joints using approved equipment and methods to produce joint dimensions indicated.

.3 Restrict speed of saw cutting to ensure proper joint alignment and to avoid damage to concrete.

.4 Supply sufficient workers and equipment including standby equipment, to maintain satisfactory sawing schedule.

.5 Schedule sawing operations on 24 hours basis and consistent with concrete placing.

.6 Make initial saw cuts in progressive manner and as soon as concrete surface has hardened sufficiently to resist ravelling as cut is made and before shrinkage cracks occurs.

.7 If cracking occurs ahead of saw cut, stop sawing immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1 m saw cut from one edge and complete sawing from opposite edge. Adjust sawing schedule accordingly.

.8 If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques suspend further concrete operations until situation is corrected and immediately remove and replace damaged slabs.

.9 Immediately on completion of sawing, flush joints with water to remove laitance.

.3 Sealing:

.1 Seal joints before allowing vehicular traffic on new pavement.

.2 Provide Departmental Representative with copy of sealant manufacturer's instructions for application. Just prior to sealing joint, clean with compressed air or flush with high pressure water to remove laitance, curing compound and protrusions of hardened concrete. Clean and dry by compressed air and vacuum to remove loose and foreign material.

.3 Do not apply joint sealant in rainy weather or when ambient temperature is less than 5 degrees C.

.4 Insert approved filler and bond breaking material in joint prior to applying sealant, then fill joint from bottom up with sealant to avoid trapping air.

.5 Prepare sealant for application using equipment and methods approved by Departmental Representative.

.6 Apply sealant strictly in accordance with manufacturer's recommendations with special attention to temperature ranges for safe heating and for application of hot poured sealants and cleanliness of concrete to be bonded.

.7 On completion of first application of sealant, return and top up any under filled areas.

.8 Replace sealant which fails to bond to concrete or fails to cure properly, as directed by Departmental Representative

3.15 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report including:

.1 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken.

.2 Slump.

.3 Air content.

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

.5 Air and concrete temperature.

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

.1 Ensure testing laboratory is certified to CSA A283.

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

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

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

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

3.16 DEFECTIVE CONCRETE

.1 Concrete is defective when:

.1 It contains: honeycombing, embedded debris, uncontrolled shrinkage cracking, or other surface defects.

.2 It is damaged by freezing.

.3 It is placed at too high temperature.

.4 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.

3.17 REPAIR/RESTORATION

.1 Repair of defective concrete work:

.1 Where defective concrete is identified by Departmental Representative during plastic condition, repair using methods approved by Departmental Representative

.2 Grind off high surface variations where directed by Departmental Representative

.2 Remove and replace defective concrete where directed by Departmental Representative.

.1 Remove minimum 4 m of pavement by sawing through concrete across full lane width.

.2 Replace with new concrete to this specification.

.3 Construct contraction joint at boundary between sawn face of existing concrete and new concrete.

.4 Install new reinforcement dowel bars between old and new concrete as directed by Departmental Representative.

3.18 CLEANING

.1 No wash-out facilities available on site for concrete trucks. Any wash water must be self contained.

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

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

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

3.19 PROTECTION

.1 Do not open concrete pavement to traffic or construction equipment until joints have been sealed and concrete reaches a minimum flexural strength of 4.0 MPa unless fast track concrete procedure is used and approved by Departmental Representative.

END OF SECTION

1 General

1.1 DUST CONTROL

.1 Dust control shall be the responsibility of the Contractor, and is considered incidental to contract bid items.

2 Products

2.1 MATERIALS

.1 Water: to Departmental Representative approval.

3 Execution

3.1 APPLICATION

.1 Apply water with distributors equipped with spray system to ensure uniform application and with means of shut-off.

END OF SECTION

1. General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Samples:

.1 If requested submit to Departmental Representative following material sample quantities at least 4 weeks prior to commencing work.

.1 Two1 L samples of each type of paint.

.2 One 1 kg sample of glass beads.

.3 Sampling to Master Painter Institute (MPI).

.2 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, and formulation number and batch number.

2. Products

2.1 MATERIALS

.1 Paint:

.1 To MPI -EXT 2.1B, Alkyd zone/traffic marking.

.2 Paints: in accordance with MPI recommendation for surface conditions.

.3 Colour: to MPI listed, yellow, black, white.

.2 Thinner: to MPI listed manufacturer.

.3 Glass reflective beads: type suitable for application to wet paint surface for light reflectance.

.4 Traffic Signs:

.1 All traffic control signage to meet TAC standards, current edition MUTCD.

.2 Signs to be mounted on wood or metal posts as indicated on construction drawings.

3. Execution

3.1 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.

3.2 APPLICATION

.1 Survey the existing pavement markings prior to removal of asphalt for application of replacement markings to same location after construction.

.2 Pavement markings: Restore all existing pavement markings disturbed by construction to pre-construction location.

.3 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.

.4 Apply traffic paint evenly at rate of 3 m^2/L.

.5 Symbols and letters to dimensions as per pre-construction survey.

.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 0.5kg/l of painted area immediately after application of paint.

3.3 INSTALLATION

.1 Re-install any signage removed for construction to original locations and to meet TAC standards, current edition MUTCD.

3.4 PROTECTION OF COMPLETED WORK

.1 Protect pavement markings until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION