

## Drawings and Specifications

### Drawings

000 Location Plan & Drawing Index  
100 Plan Views  
200 Custom Culvert Installation Drawings  
300 Typical Sections

### Specifications

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END OF SECTION

**Part 1 General**

**1.1 ORDER OF PRECEDENCE**

- .1 In addition to GC 1.2.2 – Order of Precedence, Division 01 takes precedence over any contradictory statements made within any of the technical specification sections.

**1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises of culvert supply and installation, grubbing, excavating and reshaping of ditches, milling and full depth reclamation of the existing asphalt pavement, supply and placement of shouldering aggregate and construction of a surfacing structure on Highway 10, in the Riding Mountain National Park (RMNP), Manitoba.
- .2 The following are key locations relative to the project:
  - .1 South Boundary of RMNP: Hwy 10 – km 0
  - .2 South park gate of RMNP: Hwy 10 – km 0.5
  - .3 Southern Limit of Gravel Shouldering Work: Hwy 10 – km 0.9
  - .4 Parks Canada Maintenance Compound – km 2.8
  - .5 Approach to be Repaired and Surfaced: Hwy 10 – km 6.5 (Junction with Hwy 19)
  - .6 Grey Owl Staging Area Access: Hwy 10 – km 7.3
  - .7 Hwy 10 junction with Lake Audy Rd: Hwy 10 – km 15.5
  - .8 Large Diameter Culvert Installation and Re-Surfacing: Hwy 10 – km 35.1
  - .9 Start of Road Rehabilitation: Hwy 10 – km 40.2
  - .10 Culvert Boring/Jacking Location: Hwy 10 – km 45.4
  - .11 Agassiz Tower Site: Hwy 10 – km 48.1
  - .12 North park gate of RMNP: Hwy 10 – km 53.2
  - .13 End of Project: Hwy 10 – km 54.1

**1.3 CONTRACT METHOD**

- .1 Construct Work under combined price contract.

**1.4 WORK BY OTHERS**

- .1 Other Contractors may be working within RMNP. Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative. No claims for delays, lost profit or inconvenience will be entertained.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to the Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

- .3 Work of Project executed prior to start of the Work of this Contract, and which is specifically excluded from this Contract:
  - .1 Clearing; salvaging and stockpiling useable timber at the Maintenance Compound and mulching remaining brush in place.

## **1.5 WORK SEQUENCE**

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction and allow Owner/Departmental Representative unrestricted access to inspect all phases of the Work.
- .2 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities unless approved by the Departmental Representative.
- .3 Maintain fire and emergency access/control.
- .4 **Complete all Work by August 31, 2018 (Contract Completion Date).**

## **1.6 CONTRACTOR USE OF PREMISES**

- .1 Unrestricted use of site, subject to Section 01 14 00.
- .2 Limit use of premises for Work, for storage, and for access, to allow:
  - .1 Owner occupancy.
  - .2 Work by other contractors.
  - .3 Public usage.
- .3 Co-ordinate use of premises under direction of Department Representative.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .6 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Department Representative.
- .7 At completion of operations, condition of existing work: equal to or better than that which existed before new work started.

## **1.7 EXISTING SERVICES**

- .1 Notify Department Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Provide alternative routes for pedestrian and vehicular traffic.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Department Representative of findings.

- .4 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .5 Where unknown services are encountered, immediately advise Department Representative and confirm findings in writing.
- .6 Protect or maintain existing active services.
- .7 Record locations of maintained, re-routed and abandoned service lines.
- .8 Establish and maintain direct and continuous contact with the owners or operators of any Utilities which may interfere with the Work. Co-operate with them at all times and in all places of Work. Keep the Departmental Representative informed of all communications with the Utility companies and authorities.
- .9 Notify the Departmental Representative and the Utility companies at least seven days in advance of any activities which may interfere with the operation of such Utilities.
- .10 Immediately report any damage to Utilities to the Departmental Representative and to the Utility company or authority affected, promptly undertake such remedial measures as are necessary at no additional cost to the Utility Owner.

## **1.8 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders.
  - .5 Other Modifications to Contract.
  - .6 Field Test Reports.
  - .7 Copy of Approved Work Schedule.
  - .8 Park Issued Business License(s).
  - .9 Restricted Activity Permit(s).
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Spill Response Plan.
  - .12 Other documents as specified.

## **1.9 NATIONAL PARKS ACT**

- .1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.
- .2 The Contractor and any subcontractors will obtain a business license from the Parks Canada Administration Office in Wasagaming prior to commencement of the contract.

- .3 All Contractor's vehicles are required to display a vehicle work pass from Parks Canada. These permits may be obtained free of charge from the Departmental Representative, or Parks Canada.
- 1.10 LAWS TO BE OBSERVED**
- .1 Perform Work in accordance with the latest edition of all Federal and Provincial Laws, all local bylaws, acts and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work.
- Part 2 Products**
- 2.1 NOT USED**
- .1 Not used.
- Part 3 Execution**
- 3.1 NOT USED**
- .1 Not used.

**END OF SECTION**

**Part 1 General**

**1.1 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.

**1.2 SPECIAL REQUIREMENTS**

- .1 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.
- .2 No camping in the National Park is permitted. Parks Canada regulations prohibit anyone working within the Park from using public campground facilities.
- .3 Office-tool trailers as well as a Laydown area and Contractor vehicle parking will be permitted at the Grey Owl Staging Area and the Agassiz Tower Site. Water is available at the RMNP Maintenance Compound Fire Hydrant. Water may also be available from adjacent water holes, streams, or creeks or under the guidance of the Environmental Safety Officer (ESO) and the Departmental Representative.
- .4 The use of other approaches or trailheads as storage areas or for equipment parking is prohibited without approval of Departmental Representative.
- .5 No site is available in Riding Mountain National Park to set up an asphalt plant.
- .6 No work can occur in fish bearing streams prior to June 15<sup>th</sup>.
- .7 Material other than stripping, clearing debris or park equipment is not allowed along the right-of-way outside the normal hours of work.
- .8 Work is permitted on the road during daylight hours, from 7:00am to 10:00pm, 7 days a week, subject to the other restrictions. The Contractor will not be permitted to work on Civic Holidays, long weekends or the days listed below on which special event are taking place within the park. These dates shall be identified on the Contractor's Schedule:
  - .1 July long weekend: From 07:00 AM Friday, June 29, 2018 to 07:00 AM Tuesday, July 3, 2018.
  - .2 August long weekend: From 07:00 AM Friday, August 3, 2018 to 07:00 AM Tuesday, August 7, 2018.
  - .3 Triathlon: From 10:00 PM Friday August 17, 2018 to 07:00 AM Monday August 20, 2018. These are tentative dates and subject to change.
  - .4 Labour Day long weekend: From 07:00 AM Friday, August 31, 2018 to 07:00 AM Tuesday, September 4, 2017.
  - .5 Riding Mountain Challenge Bike Tour: From 07:00 AM Saturday, September 8, 2018 to 07:00 AM Monday, September 10, 2018. These are tentative dates and subject to change.
  - .6 Half Marathon: From 10:00 PM Saturday, September 15, 2016 to 07:00 AM Monday, September 17, 2018.

- .9 A request can be made to the Departmental Representative for permission to work night time shifts. The Contractor must address and accommodate reasonable mitigations in regard to environmental disturbances, impact to wildlife, road users, worker safety, and other factors impacted by night work.
- .10 No hauling of material during inclement weather will be permitted.
- .11 Unless otherwise approved by the Departmental Representative, no work is permitted before the start of a high traffic event, during the event, or the day after the event. Ensure that two-way traffic is maintained during the work stoppage.

**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 PRIME COST SUM**

- .1 The Prime Cost Sum is not a sum due to the Contractor. Rather, it is the fixed amount specified under the **Lump Sum Price Item 3 – Prime Cost Sum** to cover unforeseen contingencies.
- .2 Expenditures under the Prime Cost Sum will be authorized in accordance with procedures provided in General Condition (GC) 6, “Delays and Changes in the Work”, and “Allowable Costs for Contract Changes Under General Condition (GC) 6.4.1”
- .3 Do not include in Contract Price, additional contingency allowances for products, installation, overhead or profit.
- .4 In addition to GC 6, “Delays and Changes in the Work”, payment for Work under the **“Lump Sum Price Item 3 – Prime Cost Sum”** will be made using negotiated rates or by material, labour and equipment rates as follows:
  - .1 Hourly equipment rates will be as per the current Manitoba Heavy Construction Association (MHCA) rates.
  - .2 Hourly rental of equipment will be measured in actual working time and necessary travel time within project limits.
  - .3 Transportation time to and from site will be reimbursed only for equipment used exclusively for additional work.
  - .4 Equipment paid on standby will be paid on 50% of the relevant Less Operator rates to a maximum of 10 hrs per day.
  - .5 The Contractor may apply a 10% mark-up to subcontractor or supplier invoices only, as approved by the Departmental Representative. No mark-up will be allowed on relevant equipment and labour rates.
  - .6 A claim for additional payment will not be considered submitted until all required documentation has been received, reviewed, and approved by the Departmental Representative.
- .5 Work under the Prime Cost Sum may include, but not be limited to:
  - .1 Crack filling, or Pot hole patching.
  - .2 Road Structure Repairs.
  - .3 Disposal of existing permanent roadway signs not to be re-used.
  - .4 Supply and installation of additional permanent signs (not construction signs).
  - .5 Supply and installation of permanent raised reflective road markers, barrier reflectors and / or guide posts.
  - .6 Additional remediation or removal and replacement of unsuitable or contaminated soils not described in the contract documents.
  - .7 The addition of soil amendments or topsoil imported from outside of the Park.
  - .8 Loading, hauling and spreading excess topsoil to other locations in RMNP.



- .9 Application of SS-1 on gravel shouldering if required for stabilization.
- .10 Utility relocations.
- .11 Bonus Pay Adjustments from Asphalt Concrete Pavement (EPS).
- .12 Miscellaneous work as directed by the Departmental Representative.

**Part 2 Products****2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution****3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 MESASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2 ADMINISTRATIVE**

- .1 Attend regularly scheduled project meetings throughout the progress of the work as requested by the Departmental Representative.
- .2 Provide physical space and make arrangements for meetings if requested.
- .3 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

**1.3 PRECONSTRUCTION MEETING**

- .1 Within 7 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Contractor, major Subcontractors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
  - .1 Appointment of official representative of participants in the Work.
  - .2 Organizational Chart (including chain of command, subcontractors and engineering services information).
  - .3 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart (including work plan for each stage of construction).
  - .4 Traffic Accommodation Plan: in accordance with Section 01 55 26 - Traffic Control.
  - .5 Health and Safety Plan: in accordance with Section 01 35 29.06 - Health and Safety Requirements (including emergency response plan and medical surveillance if required).
  - .6 Environmental Protection Plan: in accordance with Section 01 35 43 - Environmental Procedures (including sediment and erosion control plan).
  - .7 Quality Control Plan: in accordance with Section 01 45 00 - Quality Control.
  - .8 Product Data, samples and suppliers: in accordance with Section 01 33 00 - Submittal Procedures and Section 01 61 00 – Common Product Requirements.
  - .9 Owner-furnished materials.

- .10 Method of surveying during the project.
- .11 Obtaining business license from Parks Canada.
- .12 Requirements for temporary facilities, site signs, offices, utilities in accordance with Section 01 52 00 - Construction Facilities.
- .13 Proposed changes, change orders, procedures, approvals required, time extensions, and administrative requirements.
- .14 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .15 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .16 Monthly progress claims, administrative procedures, photographs, and hold backs.
- .17 Appointment of survey/engineering services.
- .18 Insurances, transcript of policies.
- .19 Other business.

#### **1.4 PROGRESS MEETINGS**

- .1 During course of Work and 2 weeks prior to project completion, schedule bi-weekly progress meetings.
- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 The Departmental Representative will record minutes of meetings and circulate to attending parties and affected parties not in attendance within 7 days after meeting.
- .4 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Corrective measures and procedures to regain projected schedule.
  - .6 Review submittal schedules: expedite as required.
  - .7 Review of quality control.
  - .8 Review of Environmental items.
  - .9 Review proposed changes for effect on construction schedule and on completion date.
  - .10 Other business.

#### **Part 2 Products**

##### **2.1 NOT USED**

- .1 Not Used.

Project No. 35804

Parks Canada Agency

Road Rehabilitation  
Highway 10 km40.2 to km54.1  
Riding Mountain National Park

Section 01 31 19  
PROJECT MEETINGS  
Page 3

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

### **1.2 DEFINITIONS**

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): A graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Sunday, inclusive, will provide seven day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

### **1.3 REQUIREMENTS**

- .1 Ensure Schedule is practical and remains within specified Contract duration.
- .2 Ensure all Work required for Contract is identified in Project Schedule.

- .3 Include an allowance in Schedule for Work performed under Prime Cost Sum.
- .4 Plan to complete Work in accordance with prescribed milestones and time frame.

#### **1.4 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 10 working days of receipt of acceptance of Master Plan.

#### **1.5 PROJECT MILESTONES**

- .1 **Complete all Work by August 31, 2018 (Contract Completion Date).**

#### **1.6 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

#### **1.7 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
  - .1 Award.
  - .2 Permits.
  - .3 Pre-Mobilization Submittals.
  - .4 Mobilization.
  - .5 Approach Culvert Works.
  - .6 Large Diameter Culvert Works.
  - .7 Culvert Tunneling and Jacking Works.
  - .8 Subdrain Pipe.
  - .9 Rip-Rap.
  - .10 Grubbing.
  - .11 Ditch Excavation and Improvement.

- .12 Notching and Widening.
- .13 Full Depth Reclamation of the Existing Surface.
- .14 Milling Existing Asphalt Surface.
- .15 EPS Asphalt Concrete Pavement.
- .16 Gravel Shouldering.
- .17 Mechanical Seeding.
- .18 Additional Work as Required.
- .19 Substantial Performance.
- .20 Remediation of any noted deficiencies.
- .21 Site Clean-up / Demobilization.
- .22 Final Completion.

## **1.8 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on weekly basis and when requested by the Departmental Representative reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, providing information on materials, equipment and manpower, providing progress photographs showing examples of work completed that week, defining problem areas, anticipated delays and impact with possible mitigation.

## **1.9 PROJECT MEETINGS**

- .1 Discuss Project Schedule at regular site meetings and bi-weekly progress meetings. Identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not used.

## **Part 3 Execution**

### **3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2 ADMINISTRATIVE**

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 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.
- .5 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Verify field measurements and affected adjacent Work are co-ordinated.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .9 Keep one reviewed copy of each submission on site.

**1.3 PRODUCT DATA**

- .1 Indicate materials, methods of construction, explanatory notes and other information necessary for completion of Work.
- .2 Allow 7 days for Departmental Representative's review of each submission.
- .3 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.
- .4 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
- .5 Submit product data sheets and brochures for requirements requested in specifications Sections and as requested by Department Representative.
- .6 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made and installation of Work may proceed.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by Department Representative's review of submittals.
- .8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Department Representative's review.
- .9 Keep one reviewed copy of each submission on Site.

#### **1.4 SAMPLES**

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

#### **1.5 PHOTOGRAPHIC DOCUMENTATION**

- .1 Submit electronic copy of digital photography in jpg format, standard resolution weekly with progress reporting as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
  - .1 Viewpoints and their location.

- .3 Frequency of photographic documentation: weekly as directed Departmental Representative.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Manitoba
  - .1 The Workplace Safety and Health Act and Regulations.

**1.3 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .4 Submit copies of reports or directions issued by Federal, and Provincial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets.
- .7 Complete, sign and submit to Departmental Representative upon award of Contract "Attestation and Proof of Compliance with Occupational Health and Safety (OHS)" form.
  - .1 PCA recognizes that federal Occupational Health and Safety legislation places specific responsibilities upon PCA as owner of the work place. In order to meet those requirements, PCA has implemented a contractor safety regime to ensure roles and responsibilities assigned under Part II of the Canada Labour Code and the Canada Occupational Health and Safety Regulations are implemented and observed when involving Contractor(s) to undertake work in PCA work places, including on PCA property.
- .8 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan

as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.

- .9 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .10 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

#### **1.4 FILING OF NOTICE**

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

#### **1.5 SAFETY ASSESSMENT**

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

#### **1.6 MEETINGS**

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

#### **1.7 REGULATORY REQUIREMENTS**

- .1 Do Work in accordance with National Parks Act.
- .2 Work at site will involve contact with Manitoba Workplace Safety and Health.

#### **1.8 GENERAL REQUIREMENTS**

- .1 Act as the Prime Contractor in all matters relating to Occupational Health and Safety.
- .2 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .3 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

#### **1.9 RESPONSIBILITY**

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

## **1.10 COMPLIANCE REQUIREMENTS**

- .1 Comply with Occupational Health and Safety Act, General Safety Regulation, and Manitoba Workplace Safety and Health Regulations.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

## **1.11 UNFORSEEN HAZARDS**

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

## **1.12 HEALTH AND SAFETY CO-ORDINATOR**

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

## **1.13 POSTING OF DOCUMENTS**

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

## **1.14 CORRECTION OF NON-COMPLIANCE**

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

## **1.15 BLASTING**

- .1 Blasting or other use of explosives is not permitted.

**1.16 POWDER ACTUATED DEVICES**

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

**1.17 WORK STOPPAGE**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

## **Part 1 General**

### **1.1 MEASUREMENT AND PAYMENT**

- .1 Work in this Section includes the implementation of all site specific Environmental Protection Plans (EPP) and Erosion and Sediment Control Plans (ESC) supplied by the Departmental Representative including; materials, equipment, and labour to carry out all commitments in those plans; and monitoring and maintenance required to continually meet those commitments through project completion.
- .2 **All work outlined in this Section and required to implement the EPP and ESC will be considered incidental and will not be measured or paid for separately.**

### **1.2 REFERENCE STANDARDS**

- .1 Canada National Parks Act and Regulations.
- .2 Canadian Environmental Assessment Act (CEAA) Guidelines Order of 2003 and subsequent amendments.
- .3 Parks Canada National Best Management Practices (BMPs).
- .4 Riding Mountain National Park Highway 10 Roadway Rehabilitation, Basic Impact Analysis (BIA) [April 2016].
- .5 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832/R-92-005-[92], Storm Water Management for Construction Activities, Chapter 3.
  - .2 EPA General Construction Permit (GCP) [2012].

### **1.3 DEFINITIONS**

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

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Before commencing construction activities or delivery of materials to site, submit Complete Work Plan and allow 2 weeks for development of the Environmental Protection Plan by Departmental Representative.
  - .1 Address all work activities in work plan and provide detailed explanation of equipment and methodology of each work process showing proposed activity in each portion of area and identifying areas of limited use or non-use.

- .2 Include drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.
  - .3 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
  - .4 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
  - .5 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
  - .6 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
  - .7 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
  - .8 Respond in a timely fashion to all questions and provide all information requested by Departmental Representative in regards to Work Plan.
  - .9 In-streams work (work isolation) plan for culvert work in proximity to an active watercourse or wetland. Work plan to include methodology, equipment and materials for isolating work site and maintaining flows, and procedure for allowing the Departmental Representative access to the site to complete a fish salvage or turbidity monitoring if required.
- .3 The project specific EPP will be developed by the Departmental Representative and will be considered a Contract document that must be adhered to. It will include:
- .1 Comprehensive overview of known or potential environmental issues to be addressed during construction.
  - .2 Site specific plan to implement the most rigorous recommendations and mitigation measures outlined in the BIA as a minimum.
  - .3 Site specific erosion and sediment control plan to implement of the most rigorous recommendations and mitigation measures outlined in the BIA and Parks Canada BMPs.
  - .4 Site specific in-streams work (work isolation) plans for culvert work in proximity to an active watercourse or wetland. Work plans will include specific procedures related to the Contractor's proposed work plan to mitigate any harm to aquatic species, prevent erosion and sediment from entering the watercourse and stabilizing the area after work is complete.

## **1.5 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)**

- .1 Execution of the work is subject to the provisions within the *Canadian Environmental Assessment Act* (CEAA) Guidelines Order of 2003 and subsequent amendments.



## 1.6 START-UP AND ENVIRONMENTAL BRIEFING

- .1 All staff employed at the construction site will be subject to a briefing regarding their individual and collective responsibilities to ensure avoidable adverse environmental impact do not arise from their activities and personal choices. **Employees must attend this briefing before beginning their work at the site.** It is recognized new employees may join the Contractors' work force after the initial round of "environmental briefing". In that case and as required, subsequent "environmental briefings" can be presented as numbers warrant, by arrangement with the Environmental Safety Officer (ESO) through the Departmental Representative. Also, some sub-trades may be present at the site for a short time, to perform once-only duties. In these cases, the "environmental briefing" will be replaced by the Contractor explaining the environmental sensitivity of the work location to the sub-trade worker(s), and reviewing highlights of personal conduct expected, with reference to a one-page briefing summary to be provided to the Contractor by the ESO. A copy of this summary will be provided to each sub-trade worker joining the work force at the site.
- .2 Parks Canada will have an ESO attending the site to monitor the construction activity for conformance with the EPP, BIA and these specifications. The ESO or alternate designated Parks Canada staff member will present the "environmental briefing". The ESO's main duties are to monitor the progress of the construction on an on-going basis to ensure compliance with environmental protection measures, and to provide guidance through the Departmental Representative, in the event of unanticipated environmental problems. Although the ESO has authority to enforce National Parks Act violations, direction to the Contractor will be the duty of the Departmental Representative.

## 1.7 EQUIPMENT

- .1 All equipment is to be clean of organic materials and free of invasive species and noxious weeds. Cleaning is to be conducted in an approved location before arrival on site. All equipment that could potentially be in contact with water (ie: hoses, pumps) are to undergo an assessment by the ESO to evaluate potential for equipment to be a vector for invasive aquatic species. If cause for concern is determined by the ESO, any and all equipment that could potentially be in contact with water will be pressure washed or steam cleaned to a temperature and duration specified by the ESO. Procedure is to be observed by ESO or documentation from an approved wash facility is to be submitted prior to arrival to site.

## 1.8 FIRES

- .1 Fires and burning of rubbish on site is permitted only when approved by Departmental Representative.
- .2 Where fires or burning is permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved.
  - .1 Restore, clean and return to new condition stained or damaged work.
- .3 Provide supervision, attendance and fire protection measures as directed.

## **1.9 DRAINAGE**

- .1 Departmental Representative will develop an erosion and Sediment Control Plan (ESC) based on the submitted Work Plan identifying type and location of erosion and sediment controls required. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3.
- .2 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .3 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

## **1.10 SITE CLEARING AND PLANT PROTECTION**

- .1 Protect trees and plants on site and adjacent properties as indicated.
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
  - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.

## **1.11 WORK ADJACENT TO WATERWAYS**

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

## **1.12 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .4 Dispose of hazardous wastes in conformance with the Environmental Contaminants Act and applicable territorial regulations.

- .5 Provide manual or electric fuel systems. Gravity fed fuel systems are not allowed onsite.
- .6 Washing, refueling, servicing, etc. of machinery and storage of fuel will be setback a minimum 100 m from any watercourse, water body, or wetland.

### **1.13 HISTORICAL/ARCHAEOLOGICAL CONTROL**

- .1 All historical or archaeological objects found in National Parks are protected under the National Parks Act and Regulations are the property of Parks Canada. Historical artifacts found on the work site shall be protected and immediately reported to the ESO and Departmental Representative. Contractor to wait for instruction before proceeding with work.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 ENVIRONMENTAL PROTECTION PLAN**

- .1 The Contractor is responsible for implementing all measures in the EPP.
- .2 A Qualified Environmental Professional (QEP) supplied by the Departmental Representative or the Parks Canada ESO will attend site to monitor the construction activity for conformance with the EPP, BIA and these specifications.

### **3.2 NOTIFICATION**

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, or other elements of Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
  - .1 Do not take action until after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

### **3.3 CLEANING**

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

- .2 Bury rubbish and waste materials after receipt of written approval from Departmental Representative.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .5 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .6 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .7 Remove waste products and debris caused by Owner or other Contractors.
- .8 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .9 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C117 – [13], Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136 / C136M – [14], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D698 – [12e2], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  - .4 ASTM D3665 – [12], Standard Practice for Random Sampling of Construction Materials
  - .5 ASTM D6938 – [15], Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

**1.3 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Quality Control Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Quality Control Plan must include:
  - .1 Contact information for representative responsible for quality control program or subcontractor if applicable.
  - .2 Specific procedure for submitting daily/weekly test results.
  - .3 Testing standards and frequency for all Quality Control Testing.
- .3 All quality control tests and test results calculated, recorded and submitted to Departmental Representative on industry standard worksheets. Tests and test results certified for correctness by those performing the tests and to be signed by Contractor's representative. Original copies of all worksheets, including calculations, submitted to Departmental Representative daily.

**1.4 CONTRACTOR QUALITY CONTROL AND QUALITY CONTROL TESTING**

- .1 Minimum requirements for gradation, compaction and moisture testing:

Material	Test Item	Test Frequency <sup>1</sup>
<b>Subgrade</b>	ASTM D698, Standard Test Method for Laboratory Compaction	1 per material source or as directed by the Departmental Representative when soil characteristics change
	ASTM D6938, Density of Soil and Soil-Aggregate in Place by Nuclear Methods	1 test per lift per 20m on culvert subgrade backfill and bottom of subgrade notch or as directed by the Departmental Representative
	Proof Roll	As required by the Departmental Representative
<b>Full Depth Reclamation</b>	Test Section	Establish rolling pattern as per Section 32 01 16.80
	Proof Roll	As per Section 32 01 16.80
<b>Granular Backfill &amp; Granular Base Course</b>	ASTM C136/C136M, Sieve Analysis ASTM C117, Percent Fines	1 each per 1,500 cu. metres or as directed by the Departmental Representative when characteristics change
	ASTM D698, Standard Test Method for Laboratory Compaction	1 per material source and/or as directed by the Departmental Representative when characteristics change
	ASTM D6938, Density of Soil and Soil-Aggregate in Place by Nuclear Methods	1 test per lift per 20m on granular backfill or granular base course as directed by the Departmental Representative
<b>EPS Asphalt Concrete Pavement</b>	Test in accordance with Section 32 12 16	Test in accordance with Section 32 12 16

<sup>1</sup> QC frequencies may be decreased subject to effectiveness of Contractor QC program and with written approval from Departmental Representative.

- .2 Perform all other quality control and quality control testing as per technical specification sections. Where frequencies are not specified in the technical specification sections, as mutually agreed between the Departmental Representative and the Contractor as necessary to ensure conformance with the specified quality requirements.

## 1.5 DEPARTMENTAL REPRESENTATIVE INSPECTION AND QUALITY ASSURANCE

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions.
- .3 Departmental Representative reserves the right to sample, test, inspect and monitor the quality of material being produced and incorporated into the work at any time and as often as deemed necessary.

- .4 The Departmental Representative is under no obligation to provide the Contractor with test results.
- .5 If the Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .6 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

## **1.6 ACCESS TO WORK**

- .1 Allow inspection/testing agencies access to all Work.
- .2 Co-operate to provide reasonable facilities for such access.

## **1.7 PROCEDURES**

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

## **1.8 REJECTED WORK**

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

## **1.9 REPORTS**

- .1 Submit an electronic copy of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested.

**1.10 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.

**Part 2 Products**

**1.11 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**1.12 NOT USED**

- .1 Not Used.

**END OF SECTION**



**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2 INSTALLATION AND REMOVAL**

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

**1.3 SITE STORAGE/LOADING**

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

**1.4 CONSTRUCTION SITE ACCESS AND PARKING**

- .1 Parking will be permitted on site provided it does not disrupt performance of Work or public traffic.
- .2 Build and maintain temporary roads during period of Work as required and at the approval of the Departmental Representative.

**1.5 SECURITY**

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

**1.6 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

**1.7 SANITARY FACILITIES**

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

- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- 1.8 PROTECTION AND MAINTENANCE OF TRAFFIC**
- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Ensure dust control is adequate to provide safe operation at all times.
- .6 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .7 Verify adequacy of existing roads and allowable load limit on these roads. Contractor responsible for repair of damage to roads caused by construction operations.
- .8 Construct access and haul roads necessary.
- .9 Location, grade, width, and alignment of detour and haul roads are subject to approval by Departmental Representative.
- .10 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .11 Ensure lighting provides full and clear visibility for full width of haul road and work areas during night work operations.
- .12 Remove, upon completion of work, haul roads designated by Departmental Representative.
- 1.9 CLEAN-UP**
- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Neatly stack stored new or salvaged material not in construction facilities.

**Part 2            Products**

**2.1                NOT USED**

- .1        Not Used.

**Part 3            Execution**

**3.1                TEMPORARY EROSION AND SEDIMENTATION CONTROL**

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

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Payment for Traffic Accommodation and Traffic Control will be under **Lump Sum Price Item 2 – Traffic Accommodation.**
- .2 Partial Payments for Traffic Accommodation will be made as follows:
  - .1 40% of the amount bid under the lump sum price for Traffic Accommodation will be paid on the first progress payment after work has commenced; thereafter payments will be made in increments of twenty percent when 50%, 75% and 100% of the contract work had been performed.
- .3 No separate payment will be made for additional work including but not limited to:
  - .1 Keeping all roads within construction limits (including haul roads) clean, passable and free from potholes.
  - .2 Supply, installation, maintenance, relocation and removal of the temporary signs and mounting posts.
  - .3 Supply and Installation of temporary pavement markings after each lift of asphalt each night.
    - .1 Temporary reflective tape to be used for lower lifts.
    - .2 Temporary reflective pavement markings (TRPM) to be used for top lift.

**1.2 REFERENCES**

- .1 Manitoba Infrastructure and Transportation (MIT)
  - .1 MIT, Standard Construction Specifications – 200 – Traffic Control
  - .2 MIT, Work Zone Traffic Control Manual (2015)
- .2 Transportation Association of Canada (TAC)
  - .1 Manual of Uniform Traffic Control Devices for Canada (MUTCD) (2014).

**1.3 MIT - TRANSPORTATION STANDARD**

- .1 Comply with MIT Standard Construction Specifications – 200 – Traffic Control
  - .1 Level V Traffic Control
- .2 This section (01 55 26) takes precedence over any contradictory statements made within any of the referenced MIT Specifications sections.

**1.4 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Traffic Accommodation Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Traffic Accommodation Plan must include:
  - .1 Placement of traffic signs and delineators for each different type of work.
  - .2 Usage of Flag persons and pilot vehicles.

- .3 Procedure for Loading Trucks with grubbing debris or ditch excavation.
- .4 Procedure for Contractor's hauling trucks bypassing traffic control queues.
- .5 Training requirements for Flag persons.
- .6 Quality Control Plan to ensure proper procedures and signage are continually met.

## **1.5 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 minimize interference and hazard to travelling public.
  - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
  - .3 Do not leave equipment on travelled way overnight.
- .3 Close lanes of road only after receipt of written approval from Departmental Representative.
  - .1 Before re-routing traffic erect suitable signs and devices to MIT, Work Zone Traffic Control Manual.
- .4 Keep travelled way graded, free from pot holes and of sufficient width for required number of lanes of traffic. Provide 7 m wide minimum temporary roadway for traffic in two-way sections through Work and on detours.
  - .1 Provide 4 m wide minimum temporary roadway for traffic in one-way sections through Work and on detours.
- .5 Provide gravelled detours or temporary roads as indicated by the Departmental Representative to facilitate passage of traffic around restricted construction area.
- .6 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, except where other means of road access exist that meet approval of Departmental Representative.
- .7 Minimize dust in the construction zone by means of cleaning and watering.

## **1.6 INFORMATIONAL AND WARNING DEVICES**

- .1 Supply, install and maintain two Changeable Message Signs (CMS) with minimum three lines with eight characters per line, for the duration of project. Installation locations, and message displayed to be determined onsite with Departmental Representative.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices to MIT, Work Zone Traffic Control Manual.
- .3 Place signs and other devices in locations recommended in MIT, Work Zone Traffic Control Manual.

- .4 All traffic and warning signs shall be either bilingual or of a symbolic or pictorial type. If bilingual signs are used, the English and French message shall be of equal letter size and at same elevation, with English on left and French on right. Assistance in translation of construction and warning signs to French may be obtained from Parks Canada.
- .5 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .6 If situation on site changes, revise Traffic Accommodation Plan to approval of Departmental Representative.
- .7 Continually maintain traffic control devices in use:
  - .1 Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
  - .2 Remove or cover signs which do not apply to conditions existing from day to day.

## **1.7 CONTROL OF PUBLIC TRAFFIC**

- .1 Provide competent flag personnel, trained, and properly equipped to MIT, Work Zone Traffic Control Manual for situations as follows:
  - .1 When public traffic is required to pass working vehicles or equipment that 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 Where temporary protection is required while other traffic control devices are being erected or taken down.
  - .5 For emergency protection when other traffic control devices are not readily available.
  - .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
  - .7 At each end of restricted sections where pilot cars are required.
- .2 All flagpersons shall be trained, certified, and equipped in accordance with The Workplace Safety and Health Act (Manitoba) and associated regulations.
- .3 Delays to public traffic due to contractor's operators: 20 minutes maximum.
- .4 Provide pilot cars at the discretion of the Contractor and approval of the Departmental Representative. Equip pilot cars with orange flashing lights and signs clearly designating vehicles as pilot cars.
- .5 Provide 2-way traffic during non-working hours.

- .6 The Departmental Representative will monitor traffic control measures and may require the Contractor to modify the Traffic Accommodation Plan when deficiencies or concerns are noted. The Contractor will bear the cost of implementing these requirements.
- .7 Public Traffic shall be safely accommodated at all times, including times of inclement weather.

**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                MEASUREMENT AND PAYMENT**

- .1        Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2                REFERENCE STANDARDS**

- .1        Within text of each specifications section, reference may be made to reference standards.
- .2        Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3        If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4        Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
- .5        Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.

**1.3                QUALITY**

- .1        Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2        Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3        Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

**1.4                AVAILABILITY**

- .1        Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2        In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.



## **1.5 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .5 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

## **1.6 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Unload, handle and store such products supplied by Owner.

## **1.7 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in 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 specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

## **1.8 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative whose decision is final.

## **1.9 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

**1.10 REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.11 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

**1.12 EXISTING UTILITIES**

- .1 Protect and maintain existing active services. When services are encountered, immediately notify applicable utility company and Departmental Representative. Stake off and record location.

**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                MEASUREMENT AND PAYMENT**

- .1        Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2                REFERENCES**

- .1        Owner's identification of existing survey control points and property limits.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.4                SURVEY REFERENCE POINTS**

- .1        Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .2        Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

**1.5                SURVEY REQUIREMENTS**

- .1        **The Department Representative will provide all surveying required to complete the work identified in the Contract documents.**

**1.6                EXISTING SERVICES**

- .1        Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2        The Contractor shall provide access to and take precautions to prevent damage to services such as railroad facilities, oil pipelines, gas pipelines, water and sewage pipes, electrical and telephone lines and cables, fire hydrants, manholes and catch basins. The Contractor shall determine the exact location of such services and conduct his operations so as to avoid the possibility of damaging them. The Contractor shall pay just claims arising directly or indirectly from damage caused by his Construction operations and shall save harmless the Department from and against all claims arising therefrom.

**1.7                RECORDS**

- .1        Maintain a complete, accurate log of control and survey work as it progresses.
- .2        Record locations of maintained, re-routed and abandoned service lines.

**1.8 SUBSURFACE CONDITIONS**

- .1 A geotechnical investigation along the roadway was performed. The existing depths of surfacing structure at each borehole are noted on the plans.
- .2 The information given is known only at the borehole locations. Actual surfacing structure composition and stratigraphy between boreholes may vary.
- .3 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

**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 MEASUREMENT AND PAYMENT**

- .1 Payment for Mobilization and Demobilization will be under **Lump Sum Price Item 1 – Mobilization / Demobilization.**
- .2 50% of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete.
- .3 Remainder of the Lump Sum Price for Mobilization and Demobilization to be paid when work is complete and all materials, equipment, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other Agencies having Jurisdiction.
- .4 Payment of only 5% of the total price tendered (excluding Prime Cost Sum) will be scheduled as outlined above. If the amount bid for mobilization and demobilization is greater than 5% of the total price tendered, payment of the remainder of the amount will be authorized when the contract has been completed.

**1.2 DESCRIPTION**

- .1 Mobilization and Demobilization consists of preparatory work and operations including but not limited to, those necessary for the movement of personnel, equipment, buildings, shops, offices, supplies and incidentals to and from the project sites.
- .2 Any protective measures or movement of Contractor trailers necessitated by animal interactions and required by Parks Canada will be paid by the Departmental Representative, and are not to be anticipated in the Lump Sum Contract Price for Mobilization and Demobilization.

**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 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2 PROJECT CLEANLINESS**

- .1 No waste collection service will be provided by Parks Canada. Arrangements must be made to appropriately dispose of waste at waste facilities outside of Riding Mountain National Park
- .2 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .3 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide any on-site bear proof containers required for collection of waste materials and debris.
- .6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .7 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

**1.3 FINAL CLEANING**

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Remove dirt and other disfiguration from exterior surfaces.
- .8 Sweep and wash clean paved areas.
- .9 Clean drainage systems.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for recycling and reuse.

**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 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- .1 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 Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - .2 Request Departmental Representative inspection.
  - .2 Departmental Representative Inspection:
    - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2 Contractor to correct Work as directed.
  - .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
    - .1 Work: completed and inspected for compliance with Contract Documents.
    - .2 Defects: corrected and deficiencies completed.
    - .3 Work: complete and ready for final inspection.
  - .4 Final Inspection:
    - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, Contractor, and Owner (if required).
    - .2 When Work incomplete according to Owner and Departmental Representative, complete outstanding items and request re-inspection.

**1.3 FINAL CLEANING**

- .1 Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
- .2 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.



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Parks Canada Agency

Road Rehabilitation  
Highway 10 km40.2 to km54.1  
Riding Mountain National Park

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CLOSEOUT PROCEDURES  
Page 2

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

**Part 1        General**

**1.1            MEASUREMENT AND PAYMENT**

- .1        Work in this Section will be considered incidental and will not be measured or paid for separately.

**1.2            ADMINISTRATIVE REQUIREMENTS**

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

**1.3            AS -BUILT DOCUMENTS AND SAMPLES**

- .1        Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
  - .1        Contract Drawings.
  - .2        Specifications.
  - .3        Addenda.
  - .4        Change Orders and other modifications to Contract.
  - .5        Reviewed shop drawings, product data, and samples.
  - .6        Field test records.
  - .7        Environmental Protection Plan.
  - .8        Inspection Reports including those for traffic accommodation signage, sediment and erosion control and others as required.
  - .9        Manufacturer's certificates.
- .2        Store record documents and samples in field office apart from documents used for construction.
  - .1        Provide files, racks, and secure storage.
- .3        Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

- .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

#### **1.4 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

- .1 Record information on set of black line opaque drawings.
- .2 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .3 Legibly mark each item to record actual construction on the Contract Drawings and shop drawings including but not limited to:
  - .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.
- .4 Legibly mark each item to record actual construction in the Specifications including but not limited to:
  - .1 Manufacturer and product number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .5 Provide digital photos, if requested, for site records.

#### **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 MEASUREMENT AND PAYMENT**

- .1 Measure Asphalt Pavement Removal by Milling in square metres of surface actually removed regardless of depth removed.
- .2 No separate payment for:
  - .1 Hauling and stockpiling millings at Grey Owl Pit or the Maintenance Compound.
  - .2 Cleaning of remaining pavement surface.
  - .3 Hauling and spreading millings at approaches, trail heads or other locations within the limits of the road rehabilitation works.
  - .4 Removing and disposing offsite asphalt material that is not milled or grinded.
- .3 Payment for removing indicated thickness of asphalt paving will be under **Unit Price Item 1 - Asphalt Pavement Removal by Milling**.

**1.1 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse in accordance with Section 01 35 43 - Environmental Procedures.

**Part 2 Products**

**2.1 EQUIPMENT**

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

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed.
- .2 Protection: protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

**3.2 REMOVAL**

- .1 Remove existing asphalt pavement to lines and grades as indicated or as established by Departmental Representative in field.
- .2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.
- .3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

- .4 Suppress dust generated by removal process.

### **3.3 FINISH TOLERANCES**

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

### **3.4 CLEANING**

- .1 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.
- .2 Waste Management: separate waste materials for reuse.
  - .1 Milled asphalt material to be stockpiled in designated location at the Grey Owl staging area or the PCA Maintenance Compound as directed by Departmental Representative.
  - .2 Asphalt material removed that is not milled or grinded shall be disposed offsite.
- .3 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
  - .1 Leave Work area clean at end of each day.

**END OF SECTION**

## **Part 1 General**

### **1.1 MEASUREMENT AND PAYMENT**

- .1 Work in this Section will be considered incidental and will not be measured or paid for separately.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C127-[04], Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
  - .2 ASTM D698-[00ae1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  - .3 ASTM D4253-[00], Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

### **1.3 DEFINITIONS**

- .1 Corrected maximum dry density is defined as:
  - .1  $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
  - .2 Where: D = corrected maximum dry density kg/m<sup>3</sup>.
    - .1 F1 = fraction (decimal) of total field sample passing 19 mm sieve
    - .2 F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)
    - .3 D1 = maximum dry density, kg/m<sup>3</sup> of material passing 19 mm sieve determined in accordance with Method of ASTM D1557.
    - .4 D2 = bulk density, kg/m<sup>3</sup>, of material retained on 19 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.
  - .3 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 wet method when directed by Departmental Representative.
- .2 Corrected Optimum Moisture is defined as:
  - .1  $Mt = (F2 \times Ao) + (F1 \times Mc)$
  - .2 Where: Mt = corrected optimum moisture %.
    - .1 Mc = Optimum moisture for original proctor test, %
    - .2 F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)
    - .3 F1 = fraction (decimal) of total field sample passing 19 mm sieve
    - .4 Ao = Moisture absorbed by coarse or oversize particles, % to ASTM C127

**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 MEASUREMENT AND PAYMENT**

- .1 Clearing: has been completed by others.
- .2 Grubbing: measure in square metres of grubbing mulched to not less than 300 mm below existing ground surface.
- .3 No separate payment for:
  - .1 Ensuring no single piece of mulched material exceeds 300 mm in length and 50 mm in diameter.
  - .2 Separating, picking and disposing of chips and debris left larger than specified size after mulching at the Grey Owl staging area or offsite.
  - .3 Grubbing unnecessarily beyond lines established by Departmental Representative.
- .4 Payment for Grubbing, will be made under **Unit Price Item 2 – Grubbing**.

**1.2 REFERENCES**

- .1 Manitoba Infrastructure and Transportation (MIT)
  - .1 MIT, Standard Construction Specifications – 320 – Grubbing

**1.3 MANITOBA INFRASTRUCTURE AND TRANSPORTATION STANDARD**

- .1 Comply with MIT Standard Construction Specifications – 320 – Grubbing.
- .2 This section (31 11 00) takes precedence over any contradictory statements made within any of the referenced MIT Specifications sections.

**1.4 DEFINITIONS**

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than 300 mm above ground.
- .2 Shrubs and other vegetation that can be cut with a brush scythe or mowing machine will be considered not be considered as clearing.
- .3 Grubbing consists of mulching in-place areas previously cleared to not less than 300 mm below existing ground surface and disposing of all material not able to be mulched to the specified size, including previously chipped material, previously uprooted brush, trees and stumps, and surface debris.

**1.5 STORAGE AND PROTECTION**

- .1 Prevent damage to natural features, bench marks, utility lines, water courses which are to remain.
  - .1 Repair damaged items to approval of Departmental Representative.



- .2 Replace trees designated to remain, if damaged, as directed by Departmental Representative.
- .2 Trees and brush to be kept separate from the topsoil if being removed from site.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling.

## **Part 2 Products**

This section not used.

## **Part 3 Execution**

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

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

### **3.2 PREPARATION**

- .1 Grub areas identified on the plans and as directed by the Departmental Representative.
- .2 Grub areas outside of the plan limits as directed by the Departmental Representative including the following:
  - .1 km 19.96 to 20.05 Right
  - .2 km 20.77 to 20.95 Left
  - .3 km 24.56 to 25.35 Left
  - .4 km 34.25 to 34.73 Right
- .3 Inspect site and verify with Departmental Representative items designated to remain. Identify and mark grubbing limits in the field.
- .4 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
  - .1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.
- .5 Notify utility authorities before starting grubbing.
- .6 Keep roads and walks free of dirt and debris.

### **3.3 GRUBBING**

- .1 Mulch, grind or chip trees and stumps, roots, previously uprooted brush, previously chipped material, and surface debris on indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 300 mm below ground surface.
- .3 Separate, pick, load, haul and deliver chips, debris, roots and stumps left larger than specified size after mulching to the Grey Owl staging area or dispose of material offsite.
- .4 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m<sup>3</sup>.
- .5 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

### **3.4 REMOVAL AND DISPOSAL**

- .1 Burning or burying of cleared and grubbed materials will not be permitted within the National Park.

### **3.5 FINISHED SURFACE**

- .1 Leave ground surface in condition suitable for stripping of topsoil to approval of Departmental Representative.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Ditch Excavation: measure in linear metres of ditching, left or right of roadway.
- .2 Notching and Widening: measure in linear metres of notching and widening, left or right of roadway.
- .3 Disposal of ditch excavation: measure in cubic meters hauled away by average truck box measurement determined in the field, or by cross-sectional survey at the disposal site as determined by Departmental Representative.
  - .1 If truck box measurements are to be used, the rated capacity of the hauling vehicle carrying legal highway weights will be established by the Departmental Representative. The rated capacity of a vehicle shall not be changed without the consent of the Departmental Representative. Loads will be checked and when requested, shall be levelled by the Contractor. Deductions will be made in 0.1 cubic meter units for loads deemed to be less than the rated capacity at the sole discretion of the Departmental Representative.
- .4 Trenching: no measurement will be made under this Section for trench excavation including disposal.
  - .1 Include trenching costs in Section 33 41 16 – Subdrain Pipe
- .5 No separate payment for:
  - .1 Stripping the existing slopes and ditches of topsoil and stockpiling the material outside of the construction footprint.
  - .2 Replacing topsoil on slopes and ditches upon completion of excavation and embankment.
  - .3 Removing and salvaging permanent roadway signs required to complete excavation.
  - .4 Achieving specified compaction, including drying or watering if necessary, in top 150 mm of subgrade notch.
  - .5 Supply and placement of geotextile soil stabilization at bottom of notch.
  - .6 Rock Excavation.
  - .7 Excavating unnecessarily beyond lines established by Departmental Representative.
  - .8 Removing and disposing of roots, stumps, rocks and other materials excavated during operation.
  - .9 Removing unsuitable material from embankment attributable to negligence.
  - .10 Shattering rock to 300 mm below subgrade elevation.
  - .11 Finishing.
- .6 Payment for Excavating the Ditches will be under **Unit Price Item 3a - Ditch Excavation.**
- .7 Payment for Notching and Widening will be under **Unit Price Item 3b – Notching and Widening.**

- .8 Payment for Loading, Hauling and Disposing of surplus excavation not landscaped will be under **Unit Price Item 3c – Disposal of Ditch Excavation.**

## **1.2 DEFINITIONS**

- .1 Rock Excavation: excavation of:
- .1 Material from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort with a Caterpillar D9 crawler bulldozer or equivalent to be considered integral with parent mass.
  - .2 Boulder or rock fragments measuring in volume 2 cubic metre or more.
- .2 Common Excavation: excavation of materials that are not Rock Excavation or Stripping.
- .3 Stripping: excavation of organic material covering original ground.
- .4 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.
- .5 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

## **1.3 EXISTING CONDITIONS**

- .1 Buried services:
- .1 Before commencing work establish location of buried services on and adjacent to site.
  - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
  - .3 Prior to beginning excavation Work, notify applicable Departmental Representative. Establish location and state of use of buried utilities and structures.
  - .4 Confirm locations of buried utilities by careful soil hydrovac methods.
  - .5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
  - .6 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before re-routing.
  - .7 Record location of maintained, re-routed and abandoned underground lines.
  - .8 Confirm locations of recent excavations adjacent to area of excavation.

## **Part 2 Products**

### **2.1 GEOTEXTILE FILTER**

- .1 Geotextile soil stabilization: in accordance with Section 31 32 19.16- Geotextile soil stabilization.

**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

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

**3.2 SITE PREPARATION**

- .1 Excavate areas identified on the plans and as directed by the Departmental Representative.
- .2 Excavate areas outside of the plan limits as directed by the Departmental Representative including the following:
  - .1 Approach excavation at km 6.50 Right
- .3 Remove obstructions from surfaces to be excavated within limits indicated.

**3.3 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .4 Protect buried services that are required to remain undisturbed.

**3.4 STRIPPING OF TOPSOIL**

- .1 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared and grubbed if necessary.
- .2 Strip topsoil to depths as directed by Departmental Representative.
  - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations outside of the construction footprint as directed by Departmental Representative.
  - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 All topsoil removed to be replaced after excavation.

**3.5 DITCH EXCAVATION**

- .1 Excavate to lines, grades, elevations and dimensions as indicated and as directed by Departmental Representative.
- .2 Ensure positive drainage so water does not pool in ditches.

- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 Keep excavated and stockpiled materials safe distance away from edge of ditch as directed by Departmental Representative.
- .6 Dispose of excavated ditch material.
- .7 Do not obstruct flow of surface drainage or natural watercourses. Water logging in ROW will not be accepted.
- .8 Obtain Departmental Representative approval of completed excavation.
- .9 Trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

### **3.6 NOTCHING AND WIDENING**

- .1 Excavate to lines, grades, elevations and dimensions as indicated and as directed by Departmental Representative.
- .2 Minimum notch depth to match surfacing structure or the depth required to balance the cut and fill, whichever is greater.
- .3 Blade material from notch to toe of existing sideslope and incorporate into widening.
- .4 Construct and surface the notch in a manner that does not cause an upward movement or a distortion of the existing surfacing structure.
- .5 Compact the top 150 mm layer of earth embankment in the subgrade notch to 98% of corrected maximum dry density to ASTM D698 and dry to at least the optimum moisture content.
- .6 Place geotextile on prepared surface in accordance with Section 31 32 19.16- Geotextile soil stabilization and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .7 Install Base Course In Place in notch in accordance with Section 32 11 24- Granular Base Course.
- .8 Do not windrow embankment or surfacing materials on paved surfacing structure.
- .9 Place Asphalt Concrete in accordance with Section 32 12 16- Asphalt Paving (EPS).
- .10 Maintain design ditch elevations, existing drainage paths, and contours of surrounding land so as not to interfere or disrupt existing vegetation, wildlife, or drainage patterns.
- .11 Dispose of surplus material not able to be landscaped.
- .12 Do not obstruct flow of surface drainage or natural watercourses. Water logging in ROW will not be accepted.
- .13 Obtain Departmental Representative approval of completed excavation.
- .14 Trim, make firm and remove loose material and debris from excavations.

- .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

### **3.7 DISPOSAL**

- .1 Haul surplus material from ditch excavation to the Grey Owl Staging Area or offsite.
- .2 Dispose of surplus material by dumping, dozing, spreading, and grading material within low areas in the Grey Owl pit as designated by Departmental Representative or by disposing material offsite.

### **3.8 TRENCHING**

- .1 Excavate to lines, grades, elevations and dimensions as indicated or as directed by Departmental Representative.
- .2 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .3 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material in approved location at Grey Owl Staging area or offsite.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .9 Notify Departmental Representative when bottom of excavation is reached.
- .10 Obtain Departmental Representative approval of completed excavation.
- .11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .12 Correct unauthorized over-excavation as follows:
  - .1 Fill compacted to not less than 95% of corrected Standard Proctor maximum dry density.
- .13 Install geotextiles in accordance with Section 31 32 19.16- Geotextile soil stabilization.

### **3.9 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as directed by Departmental Representative.

- .3 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**



**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Geotextile soil stabilization used for pipe culvert, rip-rap installation, subdrain pipe trench and at the bottom of notch and widen areas according to Section 33 42 13 – Pipe Culverts, Section 31 37 00 – Rip-Rap, Section 33 41 16 – Subdrain Pipe and Section 31 23 16 – Excavation will be considered incidental and will not be measured or paid for separately.
- .2 Payment for Geotextile soil stabilization outside of pipe culvert, rip-rap installation, subdrain pipe and notch and widen areas, if requested by the Departmental Representative, will be made under the **Prime Cost Sum** lump sum item according to Section 01 21 00 - Allowances.

**1.2 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM A123/A123M-[09], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2 ASTM D4632 / D4632M-[15a], Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
  - .3 ASTM D4533 / D4533M-[15], Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
  - .4 ASTM D6241-[14], Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-4.2 No. 11.2-[2004], Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
  - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
    - .1 No.2-[M85], Methods of Testing Geosynthetics - Mass per Unit Area.
    - .2 No.3-[M85], Methods of Testing Geosynthetics - Thickness of Geotextiles.
    - .3 No.6.1-[93], Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
    - .4 No.7.3-[92], Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
    - .5 No. 10-[94], Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Test and Evaluation Reports:
  - .1 Submit copies of mill test data and certificate at least 4 weeks prior to start of Work.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
  - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect geotextiles from direct sunlight and UV rays.
  - .3 Replace defective or damaged materials with new.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan.

### **Part 2 Products**

#### **2.1 MATERIAL**

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
  - .1 Width: 3.8 m minimum.
  - .2 Length: 76 m minimum.
- .2 Physical properties:
  - .1 Minimum Grab Strength: to ASTM D4632, minimum 900 N
  - .2 Minimum Puncture Resistance: to ASTM D6241, minimum 2300 N
  - .3 Tear Strength: to ASTM D4533, minimum 350 N
- .3 Securing pins and washers: to CSA G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m<sup>2</sup> to ASTM A123/A123M.
- .4 Factory seams: sewn in accordance with manufacturer's recommendations.
- .5 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

**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 geotextile material installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 INSTALLATION**

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .4 Join successive strips of geotextile by pinning with securing pins at 500 mm intervals or by retaining overlap in place by placing of weights.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 4 hours of placement.
- .7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

**3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
  - .1 Upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for recycling and reuse.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**3.4 PROTECTION**

- .1 Vehicular traffic not permitted directly on geotextile.
- .2 Do not overload soil or aggregate covering on geotextile.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT PROCEDURES**

- .1 Measure rip-rap in cubic metres of material placed.
- .2 Payment for geotextile soil stabilization under the rip-rap will be considered incidental and will not be measured or paid for separately.
- .3 Payment for Rip-Rap will be under **Unit Price Item 4 – Rip-Rap - Class 350**.

**1.2 REFERENCES**

- .1 Manitoba Infrastructure and Transportation (MIT)
  - .1 MIT, Standard Construction Specifications – 1297 – Stone Rip-Rap

**1.3 MANITOBA INFRASTRUCTURE AND TRANSPORTATION STANDARD**

- .1 Comply with MIT Standard Construction Specifications – 1297 – Specifications For Stone Rip-Rap.
- .2 This section (31 37 00) takes precedence over any contradictory statements made within any of the referenced MIT Specifications sections.

**Part 2 Products**

**2.1 STONE**

- .1 Stone to be approved by Departmental Representative and the ESO prior to delivery to site.
- .2 No angular or blast rock to be used around culverts.
- .3 Hard, with relative density (formally specific gravity) not less than 2.65 dense, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
  - .1 Random rip-rap:
    - .1 0-15% of total volume of stones with nominal size less than 100 mm.
    - .2 15-50% of total volume of stones with nominal size less than 200 mm.
    - .3 100% of total volume of stones with nominal size of 350 mm or less.

**2.2 GEOTEXTILE FILTER**

- .1 Geotextile soil stabilization: in accordance with Section 31 32 19.16- Geotextile soil stabilization.

**Part 3            Execution**

**3.1                PLACING**

- .1        Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .2        Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .3        Place geotextile on prepared surface in accordance with Section 31 32 19.16- Geotextile soil stabilization and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .4        Place rip-rap to thickness and details as indicated.
- .5        Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.
- .6        Rip-rap to be machine or hand placed as appropriate for location and conditions of placement or as directed by the Departmental Representative.
- .7        Machine placing:
  - .1            Place rip-rap using suitable equipment.
  - .2            Do not run equipment on finished rip-rap surfaces.
- .8        Hand placing:
  - .1            Use larger stones for lower courses and as headers for subsequent courses.
  - .2            Stagger vertical joints and fill voids with rock spalls or cobbles.
  - .3            Finish surface evenly, free of large openings and neat in appearance.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT PROCEDURES**

- .1 Full Depth Reclamation including pulverizing, reshaping, water for compaction, spreading, grading and compaction of existing asphalt pavement and base course will be measured in square metres.
- .2 New granular base material, if required, including hauling, blending mixing and re-stabilizing will be measured in tonnes of material incorporated into Work.
- .3 Payment for Full Depth Reclamation will be under **Unit Price Item 5 – Full Depth Reclamation of Asphalt Pavement.**
- .4 Payment for additional base material, if required, will be under **Unit Price Item 6b – Base Course In Place.**
- .5 Payment of liquid additives, if requested by the Departmental Representative, will be paid under **Lump Sum Item 3 – Prime Cost Sum.**

**1.2 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM D1557-[09], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>(2700 kN-m/m<sup>3</sup>)).

**Part 2 Products**

**2.1 MATERIALS**

- .1 Material produced from this procedure to be well graded with a maximum particle size of 38mm.

**2.2 LIQUID ADDITIVES**

- .1 Liquid additives do not include water.
- .2 Store, transport, handle and apply in a manner so as to ensure no spillage or discharge into adjacent ditches or streams.
- .3 Protect from inclement weather.

**2.3 EQUIPMENT**

- .1 Compaction equipment must be capable of obtaining required densities in materials on project.
- .2 To have capability to effectively pulverize and blend existing pavement and underlying subbase and/or base materials. To have capability to handle various types and thicknesses of pavement surface, from 25mm to 300mm of asphalt concrete, to a maximum depth including subbase and/or base material of 400mm.

- .3 To be complete with integral metered liquid additive system to introduce liquid additives uniformly and accurately to blended materials concurrent with pulverizing and placement and only when equipment is moving.
- .4 Metering system to include a totalizer, so amount of liquid addition used during any given period can be read directly, and a litre per minute gauge to indicate instantaneous flow rate during blending operation.
- .5 Contractor shall utilize heavy vibratory rollers weighing not less than 10 tonnes for compaction of reclaimed base 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 reshaping asphalt pavement installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

#### **3.2 PREPARATION**

- .1 Schedule reclamation operations to minimize traffic disruption.
- .2 Neatly cut existing asphaltic concrete pavement at limits of reclamation operation.
- .3 Protect adjacent pavement, curb and gutter, appurtenances (manhole castings, valve covers) from damage.

#### **3.3 DEMONSTRATION**

- .1 Prior to start of work, demonstrate effectiveness of proposed reclamation operation by reclaiming test section of minimum 15m long.

#### **3.4 PULVERIZING AND RESHAPING**

- .1 Pulverize existing pavement and granular base materials to their full depth or a maximum depth of 300 mm and blend so entire mass of material is uniformly graded. Disperse liquid additive, if required, uniformly throughout processed material during pulverizing and blending operation.
- .2 Remove by hand all material with any dimension greater than 38mm.
- .3 Blade and trim pulverized pavement material to elevation and cross section dimensions as indicated.
- .4 Where deficiency of pulverized material exists, add and blend in new granular base material as directed by Departmental Representative. Do not use frozen material.

### **3.5 COMPACTING**

- .1 Establishment of Rolling Pattern
  - .1 Contractor shall demonstrate effectiveness of rolling pattern by preparing a test section of FDR base and recording nuclear densometer readings after each pass with a heavy vibratory roller weighing not less than 10 tonnes. Confirm with Departmental Representative the number of passes required to stabilize material wherein additional density is not achieved with continued compaction effort.
  - .2 Complete additional test sections as directed by the Departmental Representative if it is determined that the pulverized material has substantially changed characteristics due to differing in situ pavement and subgrade conditions from initial test section.
- .2 Proof Rolling
  - .1 Before acceptance, the compacted and graded reclaimed surface shall receive one complete coverage by the tires of a truck having a 9 tonne single axle dual tire or 17 tonne tandem axle group with dual tires with a tire pressure of 600 kPa.
  - .2 Any areas where rutting or displacement occurs shall be either excavated or replaced and proof rolled or stabilized by the addition of suitable blending material incorporated uniformly into the base to the satisfaction of the Departmental Representative
  - .3 Contractor shall proof roll the prepared FDR base surface a minimum of 48 hours prior to asphalt paving.
- .3 Compact as per established rolling pattern.
- .4 Apply water as necessary during compacting.
- .5 Where additional granular material is required, place material on road surface prior to reclaiming or spread on surface of reclaimed material and blend with reclaimed material.

### **3.6 FINISH TOLERANCES**

- .1 Reshape surface to within plus or minus 10 mm of elevation as indicated, but not uniformly high or low.
- .2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

### **3.8 PROTECTION**

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



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Parks Canada Agency

Road Rehabilitation  
Highway 10 km40.2 to km54.1  
Riding Mountain National Park

Section 32 01 16.80  
FULL DEPTH RECLAMATION  
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**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Measure loading, hauling, placing and compacting aggregate base course in tonnes.
- .2 No measurement will be made under this section for granular material incorporated into the placement and backfill of culverts.
  - .1 Including granular backfill costs for culverts in Section 33 42 13 – Pipe Culverts.
- .3 No separate payment for:
  - .1 Supply, installation, maintenance and calibration of weigh scales and a scale house.
  - .2 Supply and application of water to achieve compaction.
  - .3 Material used to repair failures caused by the Contractor's construction equipment or activities, or due to faulty workmanship.
  - .4 Material placed outside of the limits of the design cross-section.
- .4 Payment for loading, hauling, placing and compacting granular base course for shoulder preparation will be under **Unit Price Item 6a – Granular Base Course - Gravel Shouldering, Class "A" or "B"**.
- .5 Payment for loading, hauling, placing and compacting granular base course for surface placement and installation and for use in full depth reclamation, if required, will be under **Unit Price Item 6b – Granular Base Course - Base Course In Place, Class "A"**.

**1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM C117-[04], Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C131-[06], Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C136-[06], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D698-[07e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft; ) (600kN-m/m; ).
  - .5 ASTM D1557-[02e1], Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft; ) (2700kN-m/m; ).
  - .6 ASTM D1883-[07e2], Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D4318-[10], Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.

- .3 Manitoba Infrastructure and Transportation (MIT)
  - .1 MIT, Standard Construction Specifications – 700 – Granular Base Course.
  - .2 MIT, Standard Construction Specifications – 900 – Aggregate for Base Course.

### 1.3 MANITOBA INFRASTRUCTURE AND TRANSPORTATION STANDARD

- .1 Comply with MIT Standard Construction Specifications – 700 – Granular Base Course.
- .2 Comply with MIT Standard Construction Specifications – 900 – Aggregate for Base Course.
- .3 This section (33 11 23) takes precedence over any contradictory statements made within any of the referenced MIT Specifications sections.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit granular base course mix design for approval by Departmental Representative prior to production of base course.

## Part 2 Products

### 2.1 MATERIALS

- .1 Granular base course: material in accordance with the following requirements:
  - .1 MIT, Standard Construction Specifications – 700 – Granular Base Course and MIT, Standard Construction Specifications – 900 – Aggregate for Base Course.
  - .2 Gradations to be within limits specified when tested to ASTM C117 and ASTM C136. Sieve sizes to CAN/CGSB-8.2.
    - .1 Gradation to: MIT Granular Base Course Class “A” or “B” Material

Sieve Designation	% Passing	
	Gravel Class “A”	Gravel Class “B”
25 mm	-	-
19 mm	100	100
16 mm	80-100	-
12.5 mm	-	-
9.5 mm	-	-
4.75 mm	40-70	30-75
2.00 mm	25-55	25-65
0.425 mm	15-30	15-35
0.180 mm	-	-
0.075 mm	8-15	8-18

- .2 Oversize retained on the upper sieve will be permitted to a maximum of 3% of the sample, but only if 100% of the oversize will pass a sieve having openings 3mm larger than the upper sieve.
- .1 Liquid limit: to ASTM D4318, maximum 25
- .2 Plasticity index: to ASTM D4318, maximum 6.

- .3 Los Angeles degradation: to ASTM C131. Max. % loss by weight: 35
- .4 Shale content, maximum 12% by weight of the particles retained on the 4.75 mm sieve.
- .5 Clay Balls, maximum 10% by weight of particles retained on the 12.5 mm sieve.
- .6 Crushed particles: at least 35% for Class "A" and 25% for Class "B" of particles by mass within each of following sieve designation ranges to have at least 2 freshly fractured face. Material to be divided into ranges using methods of ASTM C136.

Passing		Retained on
20 mm	to	4.75 mm

### **Part 3 Execution**

#### **3.1 EXAMINATION**

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

#### **3.2 PREPARATION**

- .1 Supply and place granular base course in areas identified on the plans and as directed by the Departmental Representative.
- .2 Supply and place granular base course in areas outside of the plan limits as directed by the Departmental Representative including the following:
  - .1 Approach at km 6.50 Right
- .3 Temporary Erosion and Sedimentation Control:
  - .1 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .2 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### **3.3 SURFACE PLACEMENT AND INSTALLATION**

- .1 Place granular base after subgrade surface is inspected and approved in writing by Departmental Representative.
- .2 Placing:
  - .1 Construct granular base to depth and grade in areas indicated.
  - .2 Ensure no frozen material is placed.

- .3 Place material only on clean unfrozen surface, free from snow and ice.
- .4 Place material using methods which do not lead to segregation or degradation of aggregate.
- .5 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
  - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .7 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment:
  - .1 Ensure compaction equipment is capable of obtaining required material densities.
- .4 Compacting:
  - .1 Compact to density not less than 100 % corrected maximum dry density to ASTM D698.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.
  - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .5 Proof rolling:
  - .1 Proof Roll as directed by Departmental Representative.
  - .2 For proof rolling use standard roller of 45 400 kg gross mass with four pneumatic tires each carrying 11 350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.
  - .3 Obtain written approval from Departmental Representative to use non-standard proof rolling equipment.
  - .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
  - .5 Where proof rolling reveals areas of defective subgrade, repair as directed by Departmental Representative.
  - .6 Where proof rolling reveals defective base remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with this section at no extra cost.

### 3.4 SHOULDER PREPARATION

- .1 Place, blade and compact gravel shouldering as indicated and as directed by the Departmental Representative. Ensure gravel shouldering is stabilized and not susceptible to erosion.

- .2 **Contractor must use an approved hopper equipped mechanical spreader to deposit the shouldering aggregate adjacent to paved surfaces.** Depositing aggregate on top of paved surfaces will not be permitted.
  - .3 Avoid damage to asphalt surface during placement and compaction. Repair any damage at no extra cost.
- 3.5 SITE TOLERANCES**
  - .1 Finished base surface to be within plus or minus 30 mm of established grade and cross section but not uniformly high or low.
- 3.6 CLEANING**
  - .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
    - .1 Leave Work area clean at end of each day.
  - .2 Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
    - .1 Upon completion remove surplus materials, rubbish, tools and equipment.
- 3.7 PROTECTION**
  - .1 Maintain finished base in condition conforming to this Section until succeeding material is applied.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT PROCEDURES**

- .1 The supply and application of tack coat will be considered incidental and will not be measured or paid for separately.
- .2 Water added to emulsified asphalt will not be measured for payment.

**1.2 REFERENCE STANDARDS**

- .1 American Association of State Highway and Transportation Officials (AASHTO)
  - .1 AASHTO M081-92-UL-[04], Standard Specification for Cutback Asphalt (Rapid-Curing Type).
- .2 ASTM International
  - .1 ASTM D140/D140M-[09], Standard Practice for Sampling Bituminous Materials.
  - .2 ASTM D633-[11], Standard Volume Correction Table for Road Tar.
  - .3 ASTM D1250-[08], Standard Guide for Use of the Petroleum Measurement Tables.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-16.2-[M89], Emulsified Asphalts, Anionic Type, for Road Purposes.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt tack coat and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit two- 4 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth plastic lined jars/bottles to Departmental Representative, at least 2 weeks prior to beginning Work.
  - .2 Sample asphalt tack coat material to: ASTM D140.
  - .3 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work to ASTM D140.

**1.4 QUALITY ASSURANCE**

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

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

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect asphalt tack coats from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Deliver, store and handle materials in accordance with ASTM D140.
- .5 Provide, maintain and restore asphalt storage area.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: SS-1 or SS-1h.
- .2 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 5m.
    - .3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m<sup>2</sup> with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m<sup>2</sup>.
    - .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 metre 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.

#### **3.2 APPLICATION**

- .1 Apply asphalt tack coat only on clean and dry surface.
- .2 Dilute asphalt emulsion with water at 1:1 ratio for application.
  - .1 Mix thoroughly by pumping or other method approved by Departmental Representative.
- .3 Apply asphalt tack coat evenly to pavement surface at rate as directed by Departmental Representative, but not to exceed 0.7 L/m<sup>2</sup>.
- .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 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
  - .1 Control traffic in accordance with Section 01 55 26 – Traffic Control.
- .9 Keep traffic off tacked areas until asphalt tack coat has set.
- .10 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
- .11 Permit asphalt tack coat to set before placing asphalt pavement.
- .12 Submit summary report within 7 days minimum of date of application and include information as follows:
  - .1 Total area tack coated.

- .2 Quantity of tack coat used.
  - .3 Mean application rate.
  - .4 Actual product quantity used when using equipment on pressure distributors.
  - .5 Dipstick measurements or electronic printouts are acceptable.
  - .13 Carry out measurements in presence of Departmental Representative upon request.
  - .14 Inspect tack coat application to ensure uniformity.
    - .1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by 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 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
    - .1 Leave Work area clean at end of each day.
  - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

**END OF SECTION**

## **Part 1 General**

### **1.1 PRELIMINARY AND GENERAL**

- .1 This Section describes the materials, equipment, professional standards, and end product requirements for the construction of hot mix asphalt pavement
- .2 End Product Specifications contain the acceptance and payment criteria based on the results of specified sampling and testing. Payment of the Contract Unit Prices for the asphalt pavement product is contingent on the product meeting the QC Plan, professional standards and quality requirements of this Section and is subject to payment adjustments upward and downward in accordance to the provisions provided in these End Product Specifications (EPS).
- .3 When used in this Section:
  - .1 “acceptance” means agreement with past actions or decisions made, within the scope of the Contract.
  - .2 “authorization” means formal approval for future actions, frequently changing the Contract requirements.

### **1.2 GENERAL DESCRIPTION OF THE WORK**

- .1 Generally, the work associated with the construction of asphalt pavement and shouldering by EPS consists of the following:
  - .1 Preparing a Quality Control Plan for review before commencing the Work and providing at the production site a testing facility to provide the data needed to implement that plan;
  - .2 Supplying, screening, crushing, processing and improving aggregate to produce asphalt mix aggregate;
  - .3 Supplying and delivering asphalt cement;
  - .4 Preparing mix designs which, once reviewed and accepted by the Departmental Representative, become the basis for the accepted Job Mix Formula;
  - .5 Heating the asphalt mix aggregate and mixing it with asphalt cement to produce asphalt mix that meets the Job Mix Formula;
  - .6 Hauling, placing, compacting and finishing the asphalt mix, including all lanes, shoulders, turning lanes, pullouts, pass-throughs and approaches as indicated on drawings and as directed by the Departmental Representative.
- .2 The Contractor shall provide an end product conforming in professional standard, quality and accuracy of detail to the QC Plan and the dimensional and tolerance requirements of the contract. Where no tolerances are specified, the standard of workmanship shall be in accordance with normally accepted good practice and the provisions of this Section. Payment is subject to upward or downward adjustments based on quality acceptance tests performed by the Departmental Representative and calculations performed by the Contractor with respect to application rate.

### 1.3 DEFINITIONS

- .1 Actual Asphalt Content – Actual asphalt content is the amount of asphalt cement in the mix as determined by the Department's Quality Assurance Program.
- .2 Additives – solid or liquid materials to enhance the properties of the liquid asphalt cement or mix.
- .3 Aggregate – the crushed or screened gravel.
- .4 Asphalt Cement (AC) – a bitumen-based liquid binder used in asphalt pavement.
- .5 Asphalt Content – Asphalt Content means the percentage of asphalt cement in the mix expressed as percentage by weight of the total aggregate in the mix determined by the Oven Test procedure.
- .6 Asphalt Mix (AM) – hot plant mixture of asphalt cement and aggregate.
- .7 Asphalt Mix Aggregate (AMA) – the processed crushed aggregate just prior to the addition of asphalt cement.
- .8 Asphalt Mix Design (AMD) – the asphalt mix design that is developed through the initial trials and testing to determine and optimize the Job Mix Formula for the end product of the asphalt mix.
- .9 Asphalt Pavement (AP) – compacted asphalt mix.
- .10 Cutback Asphalt – asphalt cement which has been blended with light petroleum distillates.
- .11 Design Asphalt Content – The asphalt content upon which the Job Mix Formula is initially established.
- .12 Driving Lane – A driving lane shall mean a single lane in any area of the pavement other than a shoulder or a barrier flare.
- .13 Emulsified Asphalt – asphalt cement that has been blended with water and emulsifying agents to form aqueous emulsions, including anionic type, cationic type and high float type.
- .14 End Product Specification (EPS) – A specification whereby the Contractor is responsible for the workmanship and quality control of the construction processes, and whereby the Department reviews the workmanship and may perform the specified quality assurance sampling and testing of the end product for the purpose of determining acceptance/rejection and payment.
- .15 Job Mix Formula (JMF) – The asphalt mix “recipe”, proposed by the Contractor in accordance with 2.3.4 or an accepted variation in accordance with 2.3.10 and accepted by the Department, establishing the aggregate proportions, gradation, and the asphalt content to be used for production of asphalt mix.
- .16 Lift – A layer of asphalt mix laid in a single application then compacted.
  - .1 Top Lift – The uppermost Lift, forming the final running surface.
  - .2 Lower Lift – Any Lift below Top Lift.
  - .3 Bottom Lift – The lowest Lift (excluding Level Course).
- .17 Lot and Sub-Lot – A Lot is a portion of the work being considered for acceptance and for the determination of payment adjustments. For density, AC content, gradation and

smoothness, each Lot is comprised of a number of Sub-Lots, each of which is sampled, and then aggregated to determine the acceptability of the Lot. Lot and Sub-Lot sizes are defined in the appropriate payment adjustment provisions of this Section.

- .18 Reject Mix – asphalt mix that is deemed unacceptable for use in the project.
- .19 Sample Mean – the arithmetic mean of a set of test results constituting the sample.
- .20 Smoothness – a measure of the longitudinal profile of the pavement surface, measured as International Roughness Index (IRI).
- .21 Surplus Aggregate – aggregate surplus to the works, in split or un-split stockpiles which singly or combined will meet the asphalt mix aggregate gradation.
- .22 Random Sample – a set of test measurements taken, one each from a number of separate areas or Sub-Lots within a Lot, in an unbiased way.
- .23 Voids in Mineral Aggregate (VMA) – VMA represents the space available to accommodate the effective volume of asphalt (asphalt not absorbed into the aggregate) and the volume of air voids necessary in the mixture.

#### **1.4 QUALITY CONTROL**

- .1 General - Quality Control shall be performed by the Contractor in accordance with Section 01 45 00 and the requirements of this Section.
- .2 Quality Control Plan
  - .1 The paving component of the Contractor's Quality Control Plan shall fulfill or exceed the requirements of Appendix 1 and function integrally with any other Quality Management provisions of the Contract.
  - .2 The QC Plan shall be submitted in accordance with the timelines established in Section 01 33 00
  - .3 The Quality Control Plan must include a detailed description of the means by which the Contractor shall use the quality control test results to ensure that the workmanship, asphalt materials, aggregate, mix production, paving and pavement compaction processes will be controlled to keep the product within the specified limits. The Quality Control Plan must clearly show the flow of information from the quality control laboratory to the individuals who shall make the actual adjustments to the processes and equipment to affect this control. The plan will show time allowance for each step, the names and positions of all the people involved, and a clear description of the responsibilities of each.
- .3 Quality Control Testing and Inspection
  - .1 The Contractor shall provide and maintain equipment and qualified personnel to perform all laboratory testing, field testing and inspection necessary to determine and monitor the characteristics and properties of all the materials produced and incorporated into the work. They shall also monitor the workmanship of the final product in accordance with the Quality Control Plan as most recently submitted.
  - .2 The Contractor shall provide a testing facility(s) that meets the requirements necessary to carry out all the test procedures listed within this Section. The facility(s) must have the equipment specified under the appropriate test designation to perform the tests. The Departmental Representative shall have access at all times to the quality control facility(s).

.4 Quality Control Records

- .1 Quality Control inspections shall be recorded on check sheets and/or diaries at the time of inspection.
- .2 The results from Quality Control testing shall be reported on test logs immediately after each test is completed. The Contractor shall report all test results on Contractor-supplied forms acceptable to the Departmental Representative.
- .3 For the purposes of confirming delivery of asphalt mix to the road and the calculation of material application rates, **the Departmental Representative shall provide a road checker** to collect the weigh tickets for each load received at the placement operation. The Road Checker's Summary shall include, but not be limited to, the following information:
  - .1 Truck Number.
  - .2 Weigh Ticket Number and Net Weight of load.
  - .3 Date, time and location by station of delivery.
  - .4 Material Application Rate Dimensions and Calculations. Calculation frequency minimally shall be for every 10 loads.
  - .5 Notes pertaining to the paving of any appurtenances (letdowns, intersections, tapers, etc.).

.5 Final Quality Control Testing Reports

- .1 Prior to the issuance of a Completion Certificate, the Contractor shall provide the Departmental Representative with:
  - .1 a summary of all aggregate quality control test results;
  - .2 copies of all quality control test results for asphalt mix properties and compaction; and
  - .3 copies of all quality control charts.

**Part 2 Products**

**2.1 MATERIALS TESTING**

- .1 Test Procedures – Where a test is specified to conform to an ASTM procedure, the listed corresponding AASHTO test may be used, or vice versa. See Table A Standard Sampling and Testing Procedures.
- .2 Sieve Sizes – All aggregate gradation tests shall use the following sieve sizes: 37.5 mm, 25 mm, 19 mm, 16 mm, 12.5 mm, 9.5 mm, 4.75 mm, 2.0 mm, 0.425 mm, 0.180 mm, and 0.075 mm.

**TABLE A – STANDARD SAMPLING AND TESTING PROCEDURES**

TEST REF. No.		STANDARD TEST METHOD / PRACTICE
AASHTO	ASTM	
AGGREGATES:		
T 11	C 117	Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing
T 85	C 127	Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
T 84	C 128	Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
T 27	C 136	Sieve Analysis of Fine and Coarse Aggregates
T 112	C 142	Clay Lumps and Friable Particles in Aggregates
T 255	C 566	Total Evaporable Moisture Content of Aggregate by Drying
T 2	D 75	Standard Practice for Sampling Aggregates
T 304	C1252	Method “A”Standard Test Methods for Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)
	D 421	Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants [aka Atterberg Limit]
T 176	D 2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
	D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
	D 5821	Determining the Percentages of Fractured Particles in Coarse Aggregate
T 327	D 6928	Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
ASPHALT CEMENT:		
T 49	D 5	Penetration of Bituminous Materials
T 202	D 2171	Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer
ASPHALT MIX AND PAVEMENT:		
T 245		Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
	D 979	Standard Practice for Sampling Bituminous Paving Mixtures
T 165	D 1075	Standard Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures
	D 1188	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin Coated Specimens
	D 2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
	D 2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
T 269	D 3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
	D 4469	Standard Test Method for Calculating Percent Asphalt Absorption by the Aggregate in an Asphalt Pavement Mixture
T-308	D 6307	Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method

## 2.2 AGGREGATES

- .1 The Contractor shall supply all aggregates for the Work from sources acceptable to the Departmental Representative.
- .2 Supply of Aggregates, Aggregate Production and Characteristics
  - .1 The Contractor shall not produce aggregate until the Contractor has received written notification that their Quality Control Plan is in accordance with 1.4 and has in place testing facilities for aggregate production that are in accordance with the Quality Control Plan.
  - .2 Paving Aggregates – Paving aggregates shall meet the following requirements:
    - .1 Coarse Aggregates
      - .1 shall be all mineral matter retained on the sieve designated in the test procedures for each individual test.
      - .2 shall consist of crushed stone, crushed gravel, or combination thereof, or materials naturally occurring in a fractured condition, or materials naturally occurring of highly angular nature or rough texture.
      - .3 shall have a maximum shale content of 3%
      - .4 shall have a maximum ironstone content of 11%
      - .5 shall have a minimum crush count of 50% (percentage by weight of the blended aggregate particles retained on a 4.75mm sieve which are not shale or ironstone and have at least one freshly fractured face.)
      - .6 shall be free from coating of clay, silt or other deleterious material.
      - .7 shall meet the requirements listed in Table B.

**TABLE B – REQUIREMENTS FOR COARSE AGGREGATES**

TEST REF. #		PROCEDURES	MIT CLASS B
AASHTO	ASTM		
T 85	C 127	Maximum Water Absorption, % by mass	2
T 112	C 142	Maximum % by mass of clay balls and friable particles	1.0
	D 5821	1 Fractured Faces, Minimum % by Mass retained on the 4.75 mm sieve	50
T327	D 6928	Maximum Micro-Deval abrasion loss factor, %	18

- .2 Fine Aggregate
  - .1 shall be all mineral matter passing the sieve designated in the test procedure for each individual test.
  - .2 shall be clean, tough, durable, moderately sharp, and free from coatings of clay, silt, or other deleterious material, and shall contain no clay balls or other aggregations of fine material.



- .3 shall have a sand equivalent of not less than 40 when tested in accordance with ASTM Test D 2419.
- .4 shall have a minimum value of 45 when tested according to the AASHTO Test T 304, Method "A", - Uncompacted Void Content of Fine Aggregate when determining Fine Aggregate Angularity.
- .3 Mineral Filler and Mineral Dust
  - .1 Mineral filler shall consist of all matter passing the 0.600 mm sieve and mineral dust shall consist of all mineral matter passing the 0.075 mm sieve.
  - .2 Mineral filler and mineral dust shall be free from organic matter.
  - .3 Mineral filler shall be non-plastic when tested in accordance with ASTM Test D 4318.

## 2.3 ASPHALT MIX

- .1 Responsibility for Asphalt Mix Design
  - .1 Preparation and submission of the project asphalt mix designs for Departmental review is the responsibility of the Contractor. All costs incurred in mix design formulation are the responsibility of the Contractor.
  - .2 The Contractor shall utilise a qualified registered member of the Association of Professional Engineers and Geoscientists of Manitoba or other qualified professional acceptable to the Departmental Representative.
- .2 Requirements for Asphalt Mix Design
  - .1 All Mixes
    - .1 Asphalt mix designs shall be performed using Type A 150/200 asphalt cement (MIT Specification Number - 800) and which shall be from the same refinery contracted to supply the asphalt cement for the duration of the project.
    - .2 Any subsequent change in the asphalt cement supplied by the Contractor will require a new asphalt mix design unless permitted otherwise by the Departmental Representative.
      - .1 Marshall Mixes – The asphalt mix design shall be carried out under Marshall design criteria using the designated equipment and procedures as contained in the Asphalt Institute's Mix Design Methods for Asphalt Concrete MS-2, latest edition.
- .3 Asphalt Mix Antistrip Additives
  - .1 For Marshall, the Contractor shall determine the Index of Retained Marshall Stability (IRMS) of each asphalt mix in accordance with ASTM D 1075 "Standard Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures".
  - .2 An antistrip additive shall be added to the asphalt mix when:
    - .1 the IRMS is less than 85;
    - .2 the TSR is less than 80; or
    - .3 the Departmental Representative specifically requests it.

.4 Asphalt Mix Design Submittals

- .1 The Contractor shall submit each Asphalt Mix Design to the Departmental Representative for review. The Department will review the Asphalt Mix Design to ensure it complies with the requirements of the Contract,
- .2 Paving Work shall not proceed until the Contractor receives the results of the review in writing from the Departmental Representative. The Contractor's submissions shall include the following information:
  - .1 The gradation of each aggregate to be used in each mixture.
  - .2 The percentage by mass of each aggregate to be used in each mixture.
  - .3 The design gradation of the combined aggregate for each mixture for each of the sieve sizes applicable to the mix.
  - .4 The estimated dry sieve gradation corresponding to the JMF gradation.
  - .5 All Asphalt Mix Design Data used in arriving at the final mix designs.
  - .6 The Design Asphalt Content expressed as a percentage of the dry weight of the aggregate.
  - .7 The Design Mix Temperature, which shall be the temperature at which the kinematic viscosity of the asphalt cement is 0.17 Pa•s (170 centistokes) or as per the Asphalt Cement supplier's recommendations.
  - .8 The recommended compaction temperature.

.5 Department's Review of Asphalt Mix Design

- .1 The Departmental Representative will require up to five (5) calendar days from the time of receipt of the Asphalt Mix Design for review. The mix design must be reviewed and accepted by the Departmental Representative prior to commencement of pavement construction.
- .2 Upon acceptance of the Asphalt Mix Design, the Contractor shall prepare the laboratory equipment calibration samples, submit them to the Departmental Representative, and participate in the calibration and correlation process described in Appendix 3 Blank Aggregate Sample Preparation and Appendix 4 Ignition Oven Correlation Procedure.

.6 Ignition Oven Correlation

- .1 After receiving acceptance of the Asphalt Mix Design, the Contractor shall prepare blank aggregate samples (aggregate-only samples prepared to match the mix design) for correlation of the Contractor, Department and appeal laboratory ignition ovens. Blanks shall be prepared in accordance with Appendix 3 Blank Aggregate Samples.
- .2 The Departmental Representative shall randomly select which of the individual blanks will be used by each party.
- .3 Within 3 working days, and prior to any mix production, the Contractor and the Department shall prepare and test asphalt mix samples in accordance with Section 32 12 16 Appendix 4 Ignition Oven Correlation.

.7 Use of Calibration Factors in Reporting Asphalt Cement Content – Results from testing of any asphalt mix shall report the measured AC Content and the corrected AC Content after applying the applicable laboratory calibration factor.

- .8 Verification of Job Mix Formula from the Asphalt Mix Design
- .1 Verification of the Asphalt Mix Design will be carried out by the Contractor during the course of production of the first 1,000 tonnes of mix using the Asphalt Mix Design.
  - .2 During the first 1,000 tonnes of plant production, the Contractor may make any adjustments it chooses to the Asphalt Mix Design, testing the mix, and refining the Asphalt Mix Design to a state that fully complies with Table C-1 and C-2.

**TABLE C-1 – ASPHALT MIX AGGREGATE GRADATION LIMITS**

SIEVE SIZE	PERCENTAGE PASSING BY MASS
	MIT Medium Mix
	Class “B”
19 mm	100
16 mm	90 – 100
12.5 mm	75 – 95
9.5 mm	70 - 90
4.75 mm	55 – 70
2.0 mm	35 – 55
425 um	17 – 32
180 um	4 – 12
75 um	3 – 7

**TABLE C-2 – MARSHALL DESIGN AND PRODUCTION CRITERIA**

PROPERTY OF LABORATORY COMPACTED PAVING MIXTURE	Class “B” Pavement
Number of blows each face of test specimens	75
Minimum % Voids in Asphalt Mix Aggregate for 19 mm Medium Asphalt Mix	14
% air voids in laboratory compacted mixture for 19 mm Medium Asphalt Mix	2.5 to 4.5
Minimum Marshall Load, N @ 60°C for 150 – 200 pen	7000
Flow index, units of 0.25 mm	8 to 14
Minimum Asphalt Film Thickness, $\mu\text{m}$ (microns)	8.0
Minimum Index of Retained Stability after immersion in water at 60°C for 24 hours	85%

- .3 All mix of the Asphalt Mix Design laid must be tracked by the Contractor, and reported to the Departmental Representative, as to lay-down location and the Asphalt Mix Design values in effect at the time that mix was produced, to ensure appropriate values are used in comparing design to sampled properties.
- .4 After production of the first 1,000 tonnes, the Contractor shall declare their Job Mix Formula (JMF) to the Departmental Representative, and provide volumetric properties/test data on the final mix produced. Any future adjustments to the JMF shall comply with all requirements of Section 32 12 16.
- .5 Where the JMF varies from the Asphalt Mix Design by a cumulative amount greater than any tolerance specified in Table D, the Contractor shall do a single

point confirmatory Asphalt Mix Design and report the results to the Departmental Representative.

- .9 AC Content Bump – Upon receipt of a Job Mix Formula meeting all Contract requirements, the Department may direct the Contractor to increase the asphalt cement content by a “bump” of up to 0.3% by weight of dry aggregate in the mix.
- .10 Field Adjustment of Job Mix Formula
  - .1 A field adjustment to the Job Mix Formula is defined as a change in the asphalt cement content of the mix, aggregate gradation and/or proportioning of various aggregate sizes, within the specified limits as shown in Table D without review and acceptance of a new Asphalt Mix Design.
  - .2 The proposed field adjustment shall be submitted in writing together with supporting documentation to the Departmental Representative. Within four hours of receipt of the proposed field adjustments, the Departmental Representative will review the field adjustment for conformance with the contract requirements and notify the Contractor whether or not it is acceptable.

**TABLE D – FIELD ADJUSTMENT OF JOB MIX FORMULA**

<b>JOB MIX FORMULA PROPERTY</b>	<b>MAXIMUM CUMULATIVE FIELD ADJUSTMENT</b>
Percentage Passing by Sieve Size:	
37.5, 25.0, 19.0, and 16.0 mm	±2.0%
12.5 and 9.5 mm	±2.0%
4.75 and 2.00 mm	±1.5%
0.425 and 0.180 mm	±1.5%
0.075 mm	±0.5%
Asphalt Cement content	±0.3%

- .3 The Contractor’s field adjustment to the Job Mix Formula must comply with the Asphalt Mix Design requirements of 2.3.2 through 2.3.4 inclusive. The Contractor shall provide all supporting verification data.
- .4 After the Job Mix Formula has been established in accordance with 2.4.10, no field adjustment to that Job Mix Formula will be permitted without prior written authorization by the Departmental Representative. The Departmental Representative will limit the number of field adjustments of the Job Mix Formula to 2 from the originally derived Asphalt Mix Design.
- .5 No field adjustment will be acceptable if it results in a change from the Asphalt Mix Design, for any property, in excess of the maximum adjustment for that property permitted in Table D. All production Mix shall meet Table C-2.

### **Part 3 Equipment**

#### **3.1 EQUIPMENT AND PLANT**

- .1 All equipment and plant shall be in good mechanical condition and be capable of performing the Work in accordance with this section.

**Part 4 Execution**

**4.1 MINIMUM ACCEPTABLE CONSTRUCTION PRACTICES**

- .1 Professional standards in accordance with the Contractor's QC Plan and construction industry best practices are a core requirement of the Work. Any construction practice or activity that results in an obvious defect must be corrected by the Contractor.

**4.2 PRIME COAT AND TACK COAT**

- .1 Prime coat is not required.
- .2 Tack coat shall be supplied and applied in accordance with Section 32 12 13.16

**4.3 ADJACENT MATS, JOINTS, EDGES, AND LET-DOWNS**

- .1 Longitudinal Joints – Longitudinal joints in the Top Lift of asphalt pavement will only be permitted where lane dividing lines are to be painted. Longitudinal joints in a Lift shall be offset within 150 to 300 mm from joints in the underlying Lift. Joints shall be pinched as soon as practicable, using best compaction practices.
- .2 Longitudinal Edge – Any longitudinal edge that has been damaged by traffic or equipment shall be trimmed to provide a vertical abutting face. Vertical surfaces of roadway appurtenances shall be tack coated to the top of the new pavement only.
- .3 Contact Edge – The contact edge of abutting cooled asphalt pavement shall be thoroughly painted with a uniform coat of emulsified asphalt.
- .4 Paving Adjoining Mats – When paving an adjoining parallel mat there shall be at least a 50 mm overlap onto the previously paved surface. This overlap shall be properly constructed to form a homogeneous bond between the two mats.
- .5 Disposal of Raking Material – Any raked material from the joint shall not be placed on the new mat or placed in or in front of the paver. The Contractor shall dispose of the material in a manner acceptable to the environmental agencies and the Departmental Representative.
- .6 Discontinued Paving – When paving is discontinued in any lane on a traffic bearing roadway, the asphalt pavement shall be tapered down at a minimum slope of 25:1. When paving resumes this letdown shall be cut back so as to form a vertical face that matches the required depth being paved. Material removed from the taper shall be disposed of in a manner acceptable to the environmental agencies and the Departmental Representative.

**4.4 STOCKPILING AGGREGATES**

- .1 Stockpile Construction – Stockpiles shall be constructed as specified below.
  - .1 Unless it is specified in the Special Provisions or ordered otherwise in writing by the Departmental Representative, all crushed aggregates shall be stockpiled prior to use on the Highway.
  - .2 Stockpile sites shall be cleared of all vegetation, trees, brush, rocks or other debris and a uniform gravel surface prepared before the stockpile material is deposited on the stockpile site.

- .3 Stockpiles shall be constructed on the designated site and when completed shall be neat and regular in shape, occupying as small an area as is practicable. Spilling of material over the edges of the piles will not be permitted.
- .4 The Contractor shall ensure that stockpiles shall be built up in layers not to exceed 1 m in thickness.
- .5 The Contractor shall ensure that plank or protected runways shall be provided for operating trucks on stockpiles when the Departmental Representative deems them necessary to prevent dirt being tracked onto the crushed aggregate.
- .6 The Departmental Representative may, on receipt of a written request from the Contractor, permit the Contractor to build the final stockpile by bulldozing the aggregate from a feed pile at the end of a production belt provided that the following are maintained:
  - .1 The bulldozer(s) to be used shall be equipped with U-shaped pushing blades.
  - .2 The aggregate does not become contaminated with oversize material, mud or other objectionable material picked up from the pit floor or general working areas.
  - .3 The crushed granular aggregate is distributed evenly over the final stockpile area in lifts not greater than 150 mm in depth.
  - .4 The cone of the feeder pile at the end of the production belt shall not, without express permission, be allowed to build up to a greater height than 2 m.
  - .5 No appreciable segregation or degradation shall occur in the main stockpile as a result of using this method.
- .2 Stockpiles for Different Materials – Stockpiles of different types of material shall be located and constructed in such a manner as to prevent intermingling of the types and to prevent segregation.
- .3 Stockpile Requirements Prior to Mix Production – Before plant mixing commences, the Contractor shall have in stockpile a minimum of 20,000 tonnes of asphalt mix aggregate or 50% of the total quantity of asphalt aggregate required for the mix, whichever quantity is greater. These quantities shall be maintained throughout the crushing period. These requirements may be waived by the Departmental Representative in circumstances where such stockpiles cannot be accommodated, such as where materials are being barged in or are being hauled to the plant from a remote site.

#### **4.5 MIX PRODUCTION**

- .1 Mixing Temperature – The temperature of the asphalt mix measured at the plant discharge chute shall be maintained at  $\pm 15^{\circ}\text{C}$  of the Design Mixing Temperature designated in the accepted Mix Design, with adjustments within that range made at the Contractor's discretion. Where the Contractor plans to adjust the actual mix temperature to  $10^{\circ}\text{C}$  or more above the Design Mixing Temperature, the Contractor shall notify the Departmental Representative prior to making the adjustment. To optimize mix properties during inclement weather or to address other specific circumstances, the Departmental Representative may agree, in advance, to a higher mixing temperature.
  - .1 Any mix produced at a temperature above the upper tolerance limit may be deemed Reject Mix by the Departmental Representative.

- .2 Residual Moisture Content – The residual moisture content of the asphalt mix prior to compaction shall not exceed 1% by mass. Should foaming or bubbling persist, even below the allowed percentage of moisture, the Contractor shall modify operations accordingly.

#### **4.6 PLACING THE ASPHALT MIX**

- .1 Surface Condition – Asphalt mix shall only be placed on clean dry surfaces free from all foreign materials, and when weather and conditions are suitable. Normally, asphalt mix is only placed when the ambient air temperature is 5°C and rising and for Top Lift when the average surface temperature is also above 5°C.
- .2 Minimum and Maximum Lift Thicknesses – The minimum and maximum thickness of a compacted lift of Asphalt Concrete to meet the following requirements.
  - .1 Minimum Thickness on lower lifts is 30 mm.
  - .2 Minimum Thickness on top lift is 40 mm.
  - .3 Maximum Thickness of any lift is 65 mm.
- .3 Lay-Down Operation – Asphalt mix should be delivered to the paver at a constant rate sufficient to allow continuous placement.
- .4 Vibrating Tampers and Hand Rollers – Along curbs, manholes, headers and similar structures which are not accessible to rollers, thorough compaction shall be obtained, by use of vibrating tampers and hand rollers or other suitable methods.
- .5 Traffic – Traffic will not be permitted on the finished pavement until it has cooled to such a temperature as to ensure that no deformation or flushing of the surface will occur.
- .6 Release Agents – Lubrication of the truck boxes, pavers, rollers or other equipment in contact with asphalt mix with diesel fuel will not be permitted.
- .7 Ponding - Areas of ponding will be noted as an obvious defect and remedial works will be required.

### **Part 5 Payment**

#### **5.1 GENERAL**

- .1 Payment for supply and installation of Asphalt Pavement will be under **Unit Price Item 7 – Asphalt Concrete Pavement (EPS)**. Payment under this item will be full compensation for the supply of tack coat materials, the application of the tack coat, the supply of paving aggregates into stockpile, the supply of asphalt cement and other additives, and the construction of the asphalt pavement on prepared surfaces in accordance with the contract requirements. Applicable payment adjustments (Additions or subtractions as applicable) shall be applied in accordance with Part 6 of this Section.
- .2 Compensation for Quality Control shall be incidental to the Work.

#### **5.2 ACCEPTANCE AT ADJUSTED PAYMENT**

- .1 Acceptance of any Lot at adjusted payment will occur if it complies with the requirements of the QC Plan and Parts 3 and 4 of this Section, contains no obvious defects as per 5.3, and if:

- .1 the test results for EPS acceptance parameters (density, gradation, asphalt content, smoothness, segregation, and application rate) are such that the Lot meets the requirements for acceptance at a reduced payment;
- .2 the Lot is acceptable in respect of all other requirements; and
- .3 the Contractor has not notified the Departmental Representative in writing that it will exercise its option to either repair or remove and replace the work, at its own cost, with work meeting the requirements for acceptance at full or increased payment.

### **5.3 REJECTION FOR WORKMANSHIP DEFECTS**

- .1 Work may be rejected if it does not comply with the requirements of the QC Plan and Part 4 of this Section.
- .2 Additionally, the finished surface of any Asphalt Pavement Lift shall have a uniform texture and be free of visible signs of poor workmanship. Any obvious defects as determined by the Departmental Representative such as, but not limited to the following, may be cause for automatic rejection of asphalt pavement regardless of the values of any other acceptance parameter:
  - .1 individual bumps and dips that exceed 12 mm over 3 m;
  - .2 areas of excess or insufficient asphalt;
  - .3 improper matching of longitudinal and transverse joints;
  - .4 roller marks or roller pick-ups;
  - .5 excess tracking of prime or tack coat;
  - .6 areas contaminated by fuel oil or other deleterious materials;
  - .7 tire marks; or
  - .8 cracking or tearing.
- .3 When asphalt pavement is rejected because of obvious defects, the minimum area of rejection will be the actual length of the defect for the full width of the driving lane in which the defect exists.
- .4 Rejected work shall be promptly repaired, remedied, overlaid, or removed and replaced in a manner acceptable to the Departmental Representative. The Contractor shall be responsible for all costs including materials.
- .5 No payment will be made for work in any Lot or Sub-Lot, which has been rejected, until the defects have been remedied.

### **5.4 PARTIAL PAYMENT FOR REJECTED WORK**

- .1 In the Departmental Representative's sole discretion and without setting precedence, where any Work is reject but the Departmental Representative determines that it may be left in place, the Departmental Representative may authorize partial payment to the Contractor as full compensation for any residual value the Work may have. Notwithstanding the foregoing, the Department is under no obligation to make any payment for such Work.



## **5.5 PAVING AGGREGATE INTO STOCKPILE**

- .1 No separate payment will be made for Paving Aggregate into Stockpile. This work shall be included in Contractor price for Asphalt Pavement.

## **5.6 ASPHALT PAVEMENT**

- .1 Payment for Asphalt Pavement constructed in place shall be at the Unit Price per tonne for the quantity of mix placed in accordance with the Contract requirements.
- .2 Subject to the exception noted below, only acceptable asphalt pavement will be included in the payment quantity.
- .3 Where overlays are used as a corrective measure:
  - .1 the overlay quantity will not be included in the payment quantity, but
  - .2 the quantity of asphalt pavement covered by the overlay will be included in the payment quantity, whether or not it was acceptable.
- .4 Such payment shall be compensation in full for all work including but not limited to: loading the aggregate into the feeders; drying the aggregate; supplying, metering, and adding the asphalt cement; mixing, loading, weighing, hauling, dumping, spreading, compacting and finishing the asphalt pavement.

## **5.7 PAYMENT FOR REJECTED WORK MADE ACCEPTABLE**

- .1 When defects have been remedied in Lots or Sub-Lots which had been rejected, payment for the original quantity of material in those Lots or Sub-Lots will be made subject to payment adjustments or downward price assessments and subject to Section 6.8.
- .2 No payment adjustment will be made for any material used to replace, repair or overlay rejected work and all corrective work shall be performed entirely at the Contractor's expense.

## **Part 6 Pay Adjustment**

### **6.1 PAYMENT ADJUSTMENT**

- .1 Payment adjustments resulting from the application of this Section will be effected on each progress payment as follows.
  - .1 Density, Asphalt Content, and Gradation
    - .1 For each Lot paid for by the tonne (t), the applicable payment adjustment derived from Tables F Density, G Asphalt Content, and H Gradation, in dollars per tonne, will be expressed as positive in the case of increases and negative in the case of decreases.
    - .2 The algebraic sum of these unit adjustments will then be applied to the payment quantity for the Lot. The resulting amount, in dollars, will be the net payment adjustment, positive or negative, for that Lot.
  - .2 Application Rate
    - .1 Payment Adjustments from Table I Application Rate **shall not be included** in this contract. However, material application rates shall still be tracked and recorded by the Contractor.

- .2 The algebraic sum of the net payment adjustments for all such Lots for which payment is authorized on the current progress payment, computed in dollars, shall be the total payment adjustment for density, asphalt content, aggregate gradation, and material application rate for the current progress payment.
- .3 Segregation and Smoothness
  - .1 For each Lot with payment adjustments based on kilometer (km), the applicable unit adjustment derived from Table J-2 Segregation and Table K Smoothness, in dollars per Lot (\$/lane km), will be expressed as positive in the case of increases and negative in the case of decreases, and will be the payment adjustment, positive or negative, for that Lot.
  - .2 The algebraic sum of the payment adjustments for all such Lots for which payment is authorized on the current progress payment, computed in dollars, shall be the total payment adjustment for segregation and smoothness for the current progress payment.
- .4 Total Payment Adjustment
  - .1 The algebraic sum of the total payment adjustments for density, asphalt content, aggregate gradation, material application rate, segregation and smoothness, derived in accordance with 6.1.1 through 6.1.3 above, shall be the total payment adjustment, positive or negative, in dollars, for all attributes for the current progress payment.
  - .2 The total payment adjustment will be made by a single entry in computing the current progress payment.
- .5 Progress Payments – The process set out in 6.1.1 through 6.1.4 above will be used in computing each progress payment to which it is applicable.

**TABLE E – TEST SAMPLE SOURCE LOCATIONS**

Test	Sample Source:
Density	100 mm dia. road cores
AC Content	Loose Mix Samples
Smoothness	Centre of the Lane
Aggregate Gradation	Loose Mix Samples
Segregation	Roadway Pavement

## 6.2 DENSITY

- .1 Lot
  - .1 A Lot for density shall be one day's scheduled production of at least 7 hours plant production where no changes have occurred to criteria such as but not limited to:
    - .1 accepted Job Mix Formula,
    - .2 the specific Lift that is being placed,
    - .3 the required material application rate.
  - .2 A change in any above criteria may require a new Lot designation.
  - .3 Where one day's production is less than 7 hours, the material will be added to the next Lot that has the same criteria, as described above, except that if a test

indicates that this production is subject to a payment adjustment or to rejection, or if no further material will be produced with the same criteria, this production will be designated as a separate Lot.

- .4 A Lot shall be no more than two days total production even if the above criteria have not changed or been met.
- .2 Sub-Lot – For density, a Lot shall be divided into three equal Sub-Lots, defined by lineal metres of production
- .3 Coring
  - .1 The Contractor shall be responsible for providing all core samples for quality assurance and payment adjustment purposes. The randomly selected locations for the cores shall be supplied by the Departmental Representative to the Contractor. The Contractor shall provide 100 mm diameter cores for these purposes. The Contractor shall prepare the cores prior to the submission by removing all material not representative of the pavement Lift to be tested. The Contractor shall deliver these cores to the Departmental Representative, within 24 hours of being provided the locations for the coring, to a designated safe storage location.
  - .2 The Contractor shall fill all core holes before the roadway is re-opened to traffic. Core holes shall be filled by the following method:
    - .1 Empty the hole of water and loose material.
    - .2 Remove any excess moisture by wiping the inside with a dry towel.
    - .3 Tack coat the inside surfaces and the outside perimeter with an emulsified asphalt.
    - .4 Place asphalt mix in loosely, so that the compacted Lifts do not exceed 75 mm.
    - .5 With a minimum of 20 blows per Lift, compact the loose material using a minimum 2 kg sledge hammer and tamper.
    - .6 For additional Lifts repeat Steps 1 to 5.
    - .7 The final Lift shall be a minimum thickness of 25 mm, and finished to a level higher but not exceeding 6 mm, than the elevation of the surrounding pavement.
  - .3 The Contractor may use an alternative method if acceptable to the Departmental Representative.
  - .4 All costs associated with obtaining the cores, including the filling and compaction of the core holes are considered incidental to the contract and are the responsibility of the Contractor.
- .4 Percent Density
  - .1 The average in-place density will be determined from core samples of the completed Lift of pavement.
  - .2 One random core sample will be obtained from each Sub-Lot and the test results for the three Sub-Lots will be averaged to determine the percent density for the Lot.
    - .1 Marshall Mixes
      - .1 For the determination of Marshall Briquette Density, the Contractor shall obtain the samples as outlined in Section 32 12

- 16 Appendix 2 for each Sub-lot. All costs associated with sampling, shall be the Contractor's responsibility.
- .2 From each Sub-lot sample, the Contractor will form three briquettes as per the procedure identified in Table A and tested, and the ASTM D 2726 test results will be averaged to obtain the test value for that sample.
  - .3 The Marshall Briquette Density for a Lot is the average of the test results from the three Sub-lots. The Marshall Briquette Density value for the Lot shall be provided to the Departmental Representative prior to the provision of the coring locations to the Contractor.

$$\text{Marshall Percent Density} = \left( \frac{\text{In - place Density of Sample}}{\text{Marshall Briquette Density}} \right) \times 100$$

- .4 At the discretion of the Departmental Representative, the Department may at any time, perform and use the Departmental results in accordance with procedures as outlined above, to obtain the value for Marshall Briquette Density which will replace the values achieved under Quality Control Testing.
  - .5 Should the initial test results in any Sub-Lot be lower than 97.0%, one additional core will be taken and tested, and that result shall be averaged with the initial result to determine the new percent density for the Sub-Lot.
  - .6 In addition, the Contractor shall determine the individual Maximum Theoretical Densities (MTD) per ASTM D 2041 for each of the Sub-Lot samples and average the results of them to obtain the Lot MTD. The Contractor shall report the Lot MTD to the Departmental Representative prior to the provision of the coring locations to the Contractor.
- .5 Payment Adjustments – The payment adjustment for percent density will be the amount shown in Table F for the Sample Mean of the test results for the Lot.
  - .6 Rejection Limit – The rejection limit for percent density is the limiting value of the Sample Mean as shown in Table F. If any Sub-Lot has a value within the reject zone, the Sub-Lot is rejected and not paid for.

**TABLE F – PAYMENT ADJUSTMENTS FOR DENSITY – MARSHALL**

<b>Marshall % Density Lot Average</b>	<b>Payment Adjustment (\$ per tonne)</b>
≥ 98.5	+\$2.00
≥ 98.0 to < 98.5	+\$1.50
≥ 97.5 to < 98.0	+\$1.00
≥ 97.0 to < 97.5	+\$0.50
≥ 96.5 to < 97.0	-\$1.00
≥ 96.0 to < 96.5	-\$2.00
< 96.0	<b>REJECT</b>

- .1 Acceptance or rejection will be determined for each Sub-Lot. One opportunity will be provided to the Contractor, using non-destructive test methods, to isolate the area of low density and conduct additional compaction providing no damage is incurred to the new pavement. The Contractor shall mark out the extents of the area identified using chalk or other temporary marking acceptable to the Departmental Representative. One additional core will be taken randomly in the area of low density and will replace the core with previous low density and a new value will be calculated. The Departmental Representative shall be advised as to the scheduling of the re-compaction effort prior to the work taking place.
- .2 Where any Marshall Mix core density is less than 96%, the Contractor shall either overlay or remove and replace the previously placed area of reject mix. If the test result for density of a Sub-Lot is outside the acceptance limits, the Sub-Lot is rejected automatically regardless of the values of other acceptance parameters. To minimize the cost of rejection to the Contractor, the Contractor will be provided the opportunity to isolate the area of low density within the Sub-lot. The limits of the low density area must be verified and accepted by the Departmental Representative before remedial work proceeds.
- .7 Payment Adjustment for Density Rejected Work Made Acceptable – The payment adjustment for density will be based on testing of the replacement or overlay material where applicable. Where replacement or overlay material does not cover the entire Lot or Sub-Lot, prior tests of the uncovered area will be averaged with new tests on the corrective work.

### **6.3 ASPHALT CONTENT**

- .1 Lot
  - .1 A Lot for AC content shall be one day's scheduled production of at least 7 hours plant production where no changes have occurred to criteria such as but not limited to:
    - .1 accepted Job Mix Formula,
    - .2 the specific Lift that is being placed,
    - .3 the required material application rate.
  - .2 A change in any above criteria may require a new Lot designation.
  - .3 Where one day's production is less than 7 hours the material will be added to the next Lot that has the same criteria, as described above, except that if a test indicates that this production is subject to a payment adjustment or to rejection, or if no further material will be produced with the same criteria, this production will be designated as a separate Lot.
  - .4 A Lot shall be no more than two days total production even if the above criteria has not changed or been met.
- .2 Sub-Lot
  - .1 For AC content, a Lot shall be divided into three equal Sub-Lots, defined by lineal metres of production.
- .3 Determination of Asphalt Content

- .1 The asphalt content of the asphalt mix will be determined from loose mix samples obtained from each Sub-Lot (3 per Lot) and tested in accordance with the ASTM D 6307 test procedures listed in Table A.
- .2 One random sample will be obtained from each Sub-lot as per Appendix 2. The asphalt content of the asphalt mix will be determined using the average of the results obtained from all of the Sub-lot samples. The actual Asphalt Content of the Lot will be compared to the Job Mix Formula Asphalt Content and the deviation will be used for payment adjustment purposes.
- .3 The ignition oven calibration factor will be applied to the AC Content measured by the ignition oven, and the corrected AC Content used to determine acceptability of the mix and any payment adjustments.
- .4 Payment Adjustments – The payment adjustment for asphalt content will be the amount shown in Table G, where deviation in AC Content is determined by the percent difference, based on kg of AC per 100 kg of dry aggregate, between the JMF AC content and the actual AC Content.
- .5 Rejection Limit
  - .1 Rejection limits for asphalt content are the limiting values of the Sample Mean as shown in Table G, beyond which the Lot is rejected and not paid for.
  - .2 If the asphalt content of a Lot is within the reject zone, the Lot is rejected automatically regardless of the values of other acceptance parameters.
  - .3 For Top Lift deviations of more than 0.50% the Contractor shall either overlay or remove and replace the Lot.
  - .4 For lower Lift deviations of more than 0.55%, no payment will be made and the Departmental Representative will determine whether removal and replacement is necessary.
- .6 Payment Adjustment for Asphalt Cement Content Rejected Work Made Acceptable – The payment adjustment for Asphalt Content will be based on testing of the replacement or overlay material where applicable. Where replacement or overlay material does not cover the entire Lot or Sub-Lot, prior tests of the uncovered area will be averaged with new tests on the corrective work.

**TABLE G – PAYMENT ADJUSTMENTS FOR DEVIATION OF ASPHALT CONTENT (AC)**

<b>Differences of Actual AC Content From Designed AC Content Specified in JMF (AC in %)</b>		
<b>Actual AC Content</b>	<b>Payment Adjustment \$ per tonne</b>	
<b>(%) Greater than Specified in JMF</b>	<b>Top Lift</b>	<b>Lower Lifts</b>
$\geq -0.05$ to $\leq 0.15$	\$2.00	\$2.00
$> 0.15$ to $\leq 0.30$	\$1.50	\$1.50
$> 0.30$ to $\leq 0.35$	\$0.00	\$0.00
$> 0.35$ to $\leq 0.40$	-\$2.00	-\$2.00
$> 0.40$ to $\leq 0.45$	-\$3.50	-\$3.50
$> 0.45$ to $\leq 0.50$	-\$5.00	-\$5.00
$> 0.50$ to $\leq 0.55$	<b>REJECT</b>	-\$6.50

> 0.55	<b>REJECT</b>	<b>REJECT</b>
<b>(%) Less than Specified in JMF</b>	<b>Top Lift</b>	<b>Lower Lifts</b>
> -0.05 to $\leq$ 0.20	\$0.00	\$0.00
> 0.20 to $\leq$ 0.30	-\$1.00	-\$1.00
> 0.30 to $\leq$ 0.35	-\$3.00	-\$3.00
> 0.35 to $\leq$ 0.40	-\$5.00	-\$5.00
> 0.40 to $\leq$ 0.45	-\$7.00	-\$7.00
> 0.45 to $\leq$ 0.50	-\$8.00	-\$8.00
> 0.50 to $\leq$ 0.55	<b>REJECT</b>	-\$9.00
> 0.55	<b>REJECT</b>	<b>REJECT</b>

## 6.4 AGGREGATE GRADATION

- .1 Lot
  - .1 A Lot for aggregate gradation shall be one day's scheduled production of at least 7 hours plant production where no changes have occurred to the criteria such as but not limited to:
    - .1 accepted Job Mix Formula,
    - .2 the specific Lift that is being placed,
    - .3 the required material application rate.
  - .2 A change in any of the above criteria may require a new Lot designation.
  - .3 Where one day's production is less than 7 hours the material will be added to the next Lot that has the same criteria, as described above, except that if a test indicates that this production is subject to a payment adjustment or to rejection, or if no further material will be produced with the same criteria, this production will be designated as a separate Lot.
  - .4 A Lot shall be no more than two days total production even if the above criteria has not changed or been met.
- .2 Sub-Lot
  - .1 For aggregate gradation, a Lot shall be divided into three equal Sub-Lots, defined by lineal metres of production.
- .3 Determination of Aggregate Gradation
  - .1 Table C-1 Aggregate Gradation Limits, specifies the aggregate gradation limits, which asphalt mix design, Job Mix Formulas, and field adjustments made in accordance with 2.4.10 must be based.
  - .2 Table H shows the limiting values for acceptance and for the determination of payment adjustments. These limits are expressed as departures, on each specified sieve size, from the percentage of material passing that sieve according to the Job Mix Formula. Aggregate gradation will be determined for each Lot from loose mix samples of the completed Lift of pavement. One random sample will be obtained from each Sub-lot, and the aggregate gradation for the Lot will be determined by using the average of the 3 Sub-Lot tests to determine the Sample Mean.

- .3 Although the JMF design gradation must at all times be maintained within the limits specified in the Aggregate Table C-1, the gradation of the mix may vary outside those limits, subject to 6.5.5.
- .4 Payment Adjustments – Where the Sample Mean for every specified sieve size falls within the limiting values prescribed in a particular column of Table H, the Lot will be accepted with a payment adjustment as indicated at the bottom of that column.

**TABLE H –PAYMENT ADJUSTMENTS FOR AGGREGATE GRADATION**

Sieve Size (mm)	Divergence from JMF grading curve Percentage passing by mass (ASTM C 117 and C 136)		
	Column 1	Column 2	Column 3
12.5	±3.5	±4.5	±7.0
4.75	±3.0	±4.5	±6.0
0.425	±2.0	±3.5	±4.0
0.075	±0.75	±1.0	±1.5
<b>Payment Adjustment \$ per tonne</b>	<b>+\$0.75</b>	<b>\$0.00</b>	<b>-\$1.50</b>

- .5 Rejection Limit – Where one or more values of the Sample Mean for the specified sieves falls outside the limiting value specified in Table H, Column 3, the Lot is reject and the Contractor shall either overlay or, remove and replace the previously placed mix. The Lot will be assessed to determine whether it may remain in place, with payment made in accordance with 5.4.

## **6.5 MATERIAL APPLICATION RATE**

- .1 Lot
- .1 A Lot for material application rate shall be one day's scheduled production of at least 7 hours plant production where no changes have occurred to the criteria such as but not limited to:
- .1 the specific Lift that is being placed,
  - .2 the required material application rate.
- .2 A change in any above criteria may require a new Lot designation.
- .3 One day's production of less than 7 hours will be dealt with as follows:
- .1 the material will be added to the next Lot that has the same criteria, as described above, except that if a test indicates that this production is subject to a payment adjustment or to rejection, or if no further material will be produced with the same criteria, this production will be designated as a separate Lot,
- .4 A Lot shall be no more than two days total production even if the above criteria has not changed or been met.
- .2 Sub-Lot – Sub-Lots are not used for material application rate.
- .3 Determination of Material Application Rate – Asphalt mix shall be applied to the roadway at the rate or rates specified in the Special Provisions, on the Drawings or as otherwise directed by the Departmental Representative. Material Application Rates will be determined by the tonnage delivered to the paver as recorded by weigh tickets



generated by automated scales, divided by the area covered by the Lot after allowance has been made for entrance letdowns and/or intersections. The Contractor shall provide the material application rate calculations to the Departmental Representative at the end of each shift.

- .4 Payment Adjustments – The payment adjustments for material application from Table I Application Rate **shall not be included** in this contract.
- .5 Rejection Limits
  - .1 Where actual application rate for the Lot is within the reject zone as shown in Table I, the Lot is reject.
  - .2 A Lot rejected for application rate may be corrected by mill-and-fill or rejected with no remedial work required, subject to the authorization of the Departmental Representative.

**TABLE I – PAYMENT ADJUSTMENTS FOR MATERIAL APPLICATION RATE**

Actual Application Rate (Percent of specified rate)	Payment Adjustment \$ per tonne of material in the Lot (unless otherwise noted)	
	Bottom Lift or Single Lift	Top Lift of Multiple Lifts
≥ 110	-\$7.00 for all material in the Lot up to 110% and no payment for product in excess of 110.0%	-\$7.00 for all material in the Lot up to 106% and no payment for product in excess of 106.0%
≥ 106.0 to <110.0	-\$5.00	
≥ 105.0 to <106.0		-\$5.00
≥ 104.0 to <105.0	\$1.00	-\$3.00
≥ 96.0 to <104.0	+\$0.50	+\$0.50
≥ 94.0 to <96.0	-\$12.00	-\$2.00
≥ 92.0 to <94.0	-\$3.00	-\$3.00
≥ 90.0 to <92.0	-\$4.00	-\$4.00
≥ 85.0 to <90.0	-\$7.00	-\$7.00
<85.0	<b>REJECT</b>	<b>REJECT</b>

## 6.6 SURFACE SEGREGATION

- .1 Lot – A Lot shall be one kilometre length of Top Lift pavement for each driving lane.
- .2 Sub-Lot – Sub-Lots are not used for segregation.
- .3 Determination of Surface Segregation
  - .1 The finished pavement shall be homogeneous, free from segregation and shall be uniform with respect to surface texture. A segregated area is defined as an area within the driving lanes of the pavement wherein the texture differs visually from the texture of the surrounding pavement.
  - .2 Due to the nature of variation in asphalt mixes and their compactive characteristics, the definition of degrees of segregation will be established on a project by project basis. The Contractor and the Departmental Representative shall establish using photographs or other mutually agreed upon tools, the definition of slight, moderate and severe segregation.

- .3 The Departmental Representative and the Contractor shall evaluate the first two Lots upon completion of the second Lot, after opening to traffic, to confirm the “agreed to” guidelines. Segregation will then be evaluated only when all paving is complete.
- .4 The Departmental Representative, with the Contractor’s Representative, will observe the finished pavement to evaluate the existence, severity and extent of segregation and other surface defects. The evaluation will be completed prior to the issuance of the Completion Certificate
- .5 The rating system for categorizing the severity of Top Lift surface segregation, and repair methodology is shown in Table J-1.
- .4 Payment Adjustments – The payment adjustment for Top Lift segregation will be the applicable amount shown in Table J-2.
- .5 Repair – On Top Lift all segregation, including any areas outside the driving lanes assessed for the payment adjustment, shall be repaired according to Table J-1.
  - .1 All segregation patch repairs shall be completed to a rectangular shape.
  - .2 Repair shall be to the neat lines and dimensions of the segregated area using sand cement slurry or other product acceptable to the Departmental Representative.
  - .3 Acceptable sand cement slurry can be made as follows, with proportions varied as needed for workability:
    - .1 25 litres of SS-1 (or equivalent) emulsion
    - .2 4 – 5 kg (2 shovels) of  $\leq 3$  mm sand
    - .3 2 – 3 kg (1 shovel) Type GU (general use) Portland cement
    - .4 Additional water, if needed for workability.
    - .5 Or other products approved
  - .4 After repairs, the Lot will be re-evaluated for acceptance, but not for segregations payment adjustments.
  - .5 The Contractor shall be responsible for all costs associated with the repair of segregated areas.

**TABLE J-1 – SEGREGATION – TOP LIFT ONLY – REMEDIATION METHODOLOGY**

<b>Segregation Severity</b>	<b>Visual Appearance</b>	<b>Repair Procedures</b>
None	Completely uniform surface texture.	N/A
Slight	Matrix of asphalt binder, coarse and fine aggregate exists; visually increased presence of stone sizes.	Sand cement slurry.
Moderate	Significantly more stone than surrounding pavement; matrix of asphalt binder and coated sand particles is reduced.	Seal coat or sand cement slurry patch or neat hot mix patch or mill and fill patch.
Severe	Appears as an area of very stony mix - stone against stone - little or no matrix.	Remove and replace or overlay to limits authorized by Departmental Representative.

**TABLE J-2 – SEGREGATION – TOP LIFT ONLY – PAYMENT ADJUSTMENTS**

Payment Adjustment	Number of Segregated Areas, by Category		
	Slight	Moderate	Severe
+\$1,000 per lane km. <i>(Applies only if the criteria in all three adjacent columns are achieved)</i>	0 to 3	0	0
+\$500 per lane km. <i>(Applies only if the criteria in all three adjacent columns are achieved)</i>	4 to 5	0	0
No payment adjustment	6 to 10	0 to 1	0
-\$500 per lane km. <i>(Applies if the criteria in any one or more of the adjacent columns occurs)</i>	11 to 15	2 to 5	0 to 1
-\$1,000 per lane km. <i>(Applies if the criteria in any one or more of the adjacent columns occurs)</i>	16 or more	6 or more	2 or more

## 6.7 SMOOTHNESS

- .1 Lot – A Lot for smoothness shall be one kilometre length of Top Lift pavement for each driving lane.
- .2 Sub-Lot – A Sub-Lot for smoothness shall be a 100 metre section of a Lot, or for the last Sub-Lot within a Lot, a section of up to 100 metres.
- .3 Traffic Control for Pavement Smoothness Testing
  - .1 The Contractor shall provide traffic control for smoothness testing.
  - .2 The Departmental Representative will provide sufficient notice to the Contractor regarding when the Department will perform smoothness testing. As directed by the Departmental Representative, the Contractor will be responsible to schedule and provide traffic control for the Department's smoothness testing, including a shadow vehicle and all signage necessary. The Contractor shall also be responsible for sweeping and any other preparation work required for smoothness testing. No extra payment will be made for sweeping or other preparation work and the provision of traffic control for smoothness testing will also be considered incidental and no extra payment will be made.
  - .3 The Contractor may also be required to provide an additional Shadow Vehicle or traffic control for smoothness testing as determined by the Departmental Representative. Payment for the provisions of an additional Shadow Vehicle or traffic control, if required, will be made under the Provisional Sum Item for Site Modifications.
- .4 Determination of Pavement Smoothness
  - .1 The finished pavement surface shall be tested by the Department using a Class I precision rolling profile measuring instrument, to determine the longitudinal profile and compute the International Roughness Index (IRI) in each driving lane.

Profiles shall be measured and the IRI calculated in the centre of the lane for each Sub-Lot.

- .2 For any Sub-Lot between 50 m and 100 m in length, the IRI value shall be considered representative of a complete Sub-Lot. For any Sub-Lot less than 50 m in length, the IRI value will be combined with the proceeding Sub-Lot IRI value.
- .3 The profile shall be measured over the entire length of the pavement exclusive of structures and shoulder areas. Acceleration, deceleration and turning lanes are considered part of the driving lanes and shall be tested in accordance with this provision. For the measuring process, the Contractor shall provide the Departmental Representative a chalk guideline in the centre of the lane immediately prior to measurement.
- .5 Sub-Lot and Lot Acceptance Limits
  - .1 The reject limit and payment adjustments applicable to a road for smoothness are specified in Table K. The default values in the "Standard" column shall apply except where the Special Provisions specify that "Alternate" values apply.
  - .2 The International Roughness Index (IRI) value, calculated for each Sub-Lot, will be used to determine if the Sub-Lot or Lot will be accepted, and if so whether it will be subject to any payment adjustment.
  - .3 The Lot IRI is the average of the individual IRI values for the Sub-Lots within the Lot.
  - .4 A Sub-Lot is rejected if:
    - .1 it has an IRI within the applicable reject zone shown in Table J, subject to 6.8.7;
    - .2 for Top Lift only, there are obvious defects per 5.3 or it has unrepaired smoothness deficiencies which require remediation in accordance with 6.8.8.
  - .5 A Lot is rejected for Smoothness if any Sub-Lot is rejected.
- .6 Payment Adjustments – For Top Lift only, the payment adjustments per the applicable column of Table K shall apply to each Lot.
- .7 Remedial Work
  - .1 If the test results on a Sub-Lot of pavement indicate a payment reduction or rejection because of smoothness, the Contractor may propose remedial work to improve the smoothness. Such proposals are subject to the acceptance of the Departmental Representative, but such acceptance does not imply that the proposed remedy will be successful, and does not reduce the Contractor's responsibility for meeting the acceptance requirements. Grinding may be acceptable, but an overlay may be required. Only one attempt may be made to improve smoothness, and this must be completed within ten (10) calendar days from the time the Contractor receives notification from the Departmental Representative of the original smoothness test results for that Sub-Lot.
  - .2 Following any attempt to improve the smoothness of a Sub-Lot or Sub-Lots, the Departmental Representative will retest the Sub-Lot or Sub-Lots, and the new results will replace the previous data for the purposes of determining acceptance and payment.

- .3 No payment will be made for any material, equipment or manpower used to improve, or attempt to improve, smoothness.
- .8 Smoothness Deficiencies – Smoothness deficiencies (bumps and dips) less than 12 mm over 7.6 m will not have remedial work required. Individual deficiencies between 8 mm and 12 mm over 7.6 m will result in a \$200.00 payment adjustment for each occurrence. Deficiencies exceeding 12 mm over 7.6 m will require remedial work.
- .1 The bump or dip magnitude is the vertical difference, in millimetres, measured over a 7.6 m section. The 7.6 m length is equivalent to the length of the standard push type profilograph.

**TABLE K – PAYMENT ADJUSTMENTS FOR SMOOTHNESS**

Lot IRI (m/km)	Payment Adjustment Per Lot	
	Standard	Alternate
≤ 0.80	+\$2,000	+\$2,000
> 0.80 to ≤ 0.90	+\$1,000	+\$2,000
> 0.90 to ≤ 1.00	+\$500	+\$2,000
> 1.00 to ≤ 1.10	+\$200	+\$1,000
> 1.10 to ≤ 1.20	0	+\$500
> 1.20 to ≤ 1.30	-\$100	+\$250
> 1.30 to ≤ 1.40	-\$250	0
> 1.40 to ≤ 1.50	-\$600	-\$300
> 1.50 to ≤ 1.60	-\$1,400	-\$300
> 1.60 to ≤ 1.70	-\$2,000	-\$750
> 1.70 to ≤ 1.80	-\$3,000	-\$750
> 1.80 to ≤ 1.90	<b>REJECT</b>	-\$1,500
> 1.90 to ≤ 2.00	<b>REJECT</b>	-\$2,500
>2.00	<b>REJECT</b>	<b>REJECT</b>

## 6.8 OVERLAYS AS A CORRECTIVE MEASURE

- .1 If an overlay is used as a corrective measure on a defective Lot or Sub-Lot, the overlay thickness will be subject to the acceptance of the Departmental Representative, but shall not be less than 40 mm. In all other respects, the whole overlay will be subject to the same specifications as the pavement being overlaid. Where an overlay is used as a corrective measure in any lane, adjacent lanes shall also be overlaid whether acceptable or not.
- .2 Whether the overlay is applied as a corrective measure or is placed over otherwise acceptable pavement in order to match an adjacent lane, acceptability and payment will be determined as follows:
  - .1 acceptability, and eligibility for either positive or negative payment adjustment, will be determined entirely on the results of testing and observations conducted on the overlay, regardless of test results that have been obtained on the underlying, overlaid Lift of pavement; but

- .2 the payment quantity, for application of the Unit Prices for asphalt pavement, and the quantity, to which any payment adjustment is to be applied, will be derived from the tonnage of mix in the underlying, overlaid Lift.

## **Part 7 Appeal testing**

### **7.1 TIME LIMITS FOR APPEAL OF TEST RESULTS**

- .1 To appeal any test results, the Contractor shall serve written notice of appeal to the Departmental Representative, within the following period after receipt of the applicable test results:
  - .1 For Density, Gradation and Asphalt Content, within two (2) working days; and
  - .2 For Segregation, Smoothness and Application Rate, within three (3) working days.

### **7.2 APPEALS OF DENSITY, ASPHALT CONTENT AND GRADATION**

- .1 The Contractor may appeal the results of acceptance testing for density, asphalt content and/or aggregate gradation for any Lot only once. Appeals will only be considered if quality control results support an appeal and can be presented.
- .2 The Departmental Representative will arrange for an independent testing laboratory to perform the appeal testing. The personnel employed or testing laboratory retained by the Contractor for quality control testing on the project will not be used for appeal testing.
- .3 The appeal testing laboratory shall hold current certification from the Canadian Council of Independent Laboratories (CCIL) (<http://www.ccil.com/>) under both the Asphalt Laboratory and Aggregate Laboratory Certification Programs, and at least one technician in the asphalt laboratory shall hold current certification under the Asphalt Technician Certification Program.
- .4 Density Appeals – For density appeals:
  - .1 Quality control test results for density which are provided to the Departmental Representative subsequent to the Contractor's receipt of the quality assurance test results for that Lot will not be considered (when evaluating evidence) for an appeal.
  - .2 The appeal shall be for the failed sample(s) within the Lot, and there will be no appeal allowed for single tests within a Sub Lot.
  - .3 Any attempt to improve density on the appealed sub lot after the Departmental Representative has tested the Sub Lot for acceptance shall void the appeal and the original test results will apply.
    - .1 The Contractor shall, within two (2) working days of filing the appeal and in the presence of the Departmental Representative, take five (5) cores samples from random locations from a Sub-Lot.
    - .2 The Contractor shall then deliver new core samples to the Departmental Representative;
    - .3 The Departmental Representative shall deliver the core samples and the companion loose mix samples from the appealed Sub-Lots to the appeal testing laboratory.

- .4 The appeal agency shall prepare new briquette densities from the previously taken companion samples as per Appendix 2.
- .5 The appeal agency shall determine the BRD/MTD from the companion sample and the densities of the cores and report the results to the Departmental Representative and the Contractor. The original core test results will be discarded and a new sample mean will be calculated from the 5 random cores and shall be used for acceptance and payment adjustments for the Sub Lot.
- .5 Asphalt Content and Gradation Appeals – For asphalt content and gradation appeals
  - .1 The party who has possession of the companion loose mix samples shall deliver them to the appeal testing laboratory.
  - .2 The appeal agency shall prepare three new samples from the companion sample and determine the AC contents and gradations, average the results, and report all results to the Departmental Representative and the Contractor.
  - .3 The original test results will be discarded. A new sample mean for three new test results will be determined using the companion samples and will be used for acceptance and payment adjustments.

### **7.3 SMOOTHNESS APPEALS**

- .1 The Contractor may appeal acceptance test results of a Lot only once.
- .2 The Departmental Representative will perform, and the Contractor will be given the opportunity to witness, the appeal testing and the new results will be binding on the Contractor and the Department.

### **7.4 SEGREGATION APPEALS**

- .1 Appeals of segregation ratings will be handled by a joint review with the Contractor. If consensus cannot be reached then the Departmental Representative shall engage the Joint Committee, comprised of representatives from the Department and Manitoba Heavy Construction Association, to assess the area(s) in question.

### **7.5 APPLICATION RATE APPEALS**

- .1 Appeals of application rate will be handled by a joint review with the Contractor and Departmental Representative. If the issue cannot be resolved, the issue will be resolved through the dispute resolution provisions of the Contract General Conditions.

### **7.6 APPLICATION OF APPEAL TESTING RESULTS**

- .1 The appeal test values, thus determined, in all cases, will be binding on the Contractor and the Department.

### **7.7 PAYMENT FOR APPEAL TESTING**

- .1 If the new results indicate a change in the payment adjustment in the Contractor's favour, then sampling and testing costs incurred during the appeal procedures for that Lot would be borne by the Department.

- .2 If the new results verify that, any payment reduction or rejection remains valid for that Lot, then the costs of testing (plus 10% mark-up) incurred during the appeal procedure will be charged to the Contractor.



## **APPENDIX 1**

### **ASPHALT QUALITY CONTROL REQUIREMENTS AND GUIDELINES**

#### **1.01 GENERAL**

The Contract requirements for preparing, submitting and adhering to the paving components of a Quality Control Plan are specified in 1.4. This Appendix titled “Asphalt Quality Control Requirements and Guidelines” sets out the guidelines for the Contractor’s Quality Control Plan, in addition to those set out in 1.4 and the Specifications.

#### **1.02 QUALITY CONTROL PLAN**

The Contractor shall prepare and submit a Quality Control Plan for review. A qualified Subcontractor or an independent organization/agency may operate the Plan wholly or in part. However, the Quality Control Plan, including compliance with the Plan and its modifications, must remain the responsibility of the Contractor.

The Plan shall address all elements that affect the quality of the hot mix, hot laid asphalt pavement, including but not limited to the following:

- Purchased Materials (asphalt cement characteristics, additives, purchased aggregates, etc.)
- Aggregate production (including source quality, gradation, fracture, crushing procedures, stockpiling, etc.)
- Calibration and Correlation of Testing Equipment (plant sensors, lab equipment, nuclear moisture/density gauges, etc.)
- Mix Design
- Asphalt Plant Mixing procedures (cold feed sampling, AC flow rate, temperature control, records, weigh scale, etc.)
- Product quality (volumetrics, EPS payment elements, etc.)
- Professional standards (joints, placing temperature, rolling procedures, etc.)

The Plan shall also include the following:

- The name of the Quality Control testing agency and its proven capability to provide the specific services required for the project.
- The list of dedicated technical staff, if available, (including names, qualifications and relevant experience) and their proposed roles.
- The list of testing equipment available for project work.

The Quality Control Plan shall include the designation of specific personnel to be responsible for specific quality control duties.

- A Quality Control Manager (QCM) responsible for the development and management of the Quality Control Plan. This person shall be qualified as per the requirements identified in 1.4.3. This individual shall also be responsible for the signing off Quality Control Testing and Inspection records. This individual shall also be responsible for ensuring the qualifications of quality control staff, implementing and documenting any changes or improvements to the Quality Control Plan.

- There should be a designated Process Control Technician (PCT), with 5 years of related experience, who will ensure that laboratory test results and other quality control practices used to control the quality of aggregates and other mix components, and to adjust and control mix proportions to meet the mix design(s). The PCT is responsible for ensuring that testing equipment, utilized for proportioning and mixing are calibrated and in good working order. The Plan shall describe how the PCT's duties, including sampling methods and responsibilities are to be accomplished and documented. The Plan should also describe the criteria to be used by the PCT to correct or reject unsatisfactory materials.
- There should also be a Pavement Quality Control Technician (PQT), with 5 years of related experience, who will ensure that delivered materials meet the requirements of the specifications. In addition, the PQT shall be responsible for periodically inspecting all equipment used in placing, finishing, and compacting to assure its proper operating condition and to assure that placing, application rate, finishing, joint construction, and compaction is in conformance with this specification and the contract requirements.

#### 1.03 CONTRACTOR'S RECORD OF QUALITY CONTROL TESTING

Test results should be made on forms or charts immediately after completion of each test. These test results are to be made available to the Departmental Representative upon request.

#### 1.04 MATERIAL APPLICATION RATE

The Contractor shall control the Material Application Rate by monitoring the amount of asphalt mix delivered to the road against the area covered by checking the application rate minimally every ten loads. The Contractor shall advise the Departmental Representative in writing on an ongoing basis of the application rate.

#### 1.05 DENSITY

The Contractor should take core samples to determine actual pavement density. At the start of paving, the Contractor should take a minimum of two pavement cores from each Sub-Lot. The Contractor may employ a nuclear densitometer (or moisture/density gauge) to ensure intermediate density control. Two nuclear densities may be determined for each Sub-Lot, based on job mix densities obtained from the most recent plant briquettes.

#### 1.06 OTHER QUALITY CONTROL PROCEDURES

The Contractor may initiate other Quality Control procedures as necessary for ensuring production of a quality product and include them in the Quality Control Plan. Procedures may also be introduced after the start of work as necessary as amendments to the Quality Control Plan.

#### 1.07 QUALITY CONTROL TESTING FREQUENCY

Minimum test frequencies guidelines for Quality Control are described in the following table:

**TABLE APPENDIX 1-A – GUIDELINES FOR MINIMUM TEST FREQUENCIES**

	ASTM TEST	MINIMUM FREQUENCY <sup>1</sup>
Tests During Aggregate Production	C 136, Dry Sieve Analysis of Aggregate or C 117 Sieve Analysis of Aggregates by Washing ( <i>Modified for Field Lab with drying done over a hotplate or similar heating element</i> )	- Split Stockpiles: 1 for each stockpile for every 2 hours of production. - One main stockpile: for every 300 tonnes. - Blend Sand: 1 for every 100 tonnes during stockpiling. - Natural filler: 1 for every 50 tonnes during stockpiling.
	D 5821 Determining the Percentage of Fractured Particles in Coarse Aggregate	Every second coarse aggregate sieve test.
	C 117 Sieve Analysis of Aggregates by Washing ( <i>Modified for Field Lab</i> )	1/shift on reduced sample obtained from combined samples from the crusher
Asphalt Products Tests	Tack and Prime	Contractor's option.
Tests During Asphalt Plant Mixing	C 136, Dry Sieve Analysis of Aggregate	1 of combined aggregate (off the belt) every 300 tonnes.
	C 566 & D 2216, Moisture Content	Aggregate: 2 tests/Lot Asphalt mix: 1 on first Sub-Lot and every second day.
	C 117 Sieve Analysis of Aggregates by Washing ( <i>Modified for Field Lab</i> )	1/shift on reduced sample obtained from combined samples from the plant cold feed
	D 5581 Resistance to Plastic Flow Using Marshall Apparatus.	One set of three briquettes for 1,200 tonnes or Lot, whichever is less.
	D 6307 Asphalt Extraction, Ignition Method	One/Lot.
	D-5 Penetration of Bituminous Materials	One per Manufacturer's Batch. Samples should be taken for every 3000 tonnes of mix production
	D 2171 Viscosity	Contractor's Option
	D 2041 Maximum Theoretical Density	One per sub-lot
Test During Asphalt Paving for Density Testing	AASHTO T 245-97 Resistance to Plastic Flow Using Marshall Apparatus	One 15 kg sample for every Sub-Lot or minimum 1/day for field testing
	Core Samples	At start, two cores for each Sub-Lot. After rolling pattern established, only one core for each Sub-Lot. All Marshall mix cores to be a minimum of 100 mm diameter;

Note (1) These are the minimum frequencies and the Contractor is responsible to assess the need to increase testing frequency, where aggregate source is not uniform or any other condition exists that may warrant it. QC frequencies may be reduced below this level, subject to the Departmental Representative's authorization, should the Contractor's QC Plan be proven very effective.

## **APPENDIX 2**

### **OBTAINING AND PREPARING LOOSE MIX SAMPLES**

1. Three (3) samples per Sub-Lot shall be obtained by the Contractor, at locations and times chosen by the Departmental Representative. The first sample shall be used by the Contractor for Quality Control, the second sample by the Department for Quality Assurance, with the third retained by the Department for potential appeal testing.
2. The samples taken shall meet the requirements of ASTM D 979 Sampling of Bituminous Mixtures, Table 1, Size of Sample.
3. The sample size shall be reduced to required laboratory sample size for Marshall and Superpave gyratory briquettes, asphalt content and hot mix gradation determination as outlined below:
  - .1 The sample shall either be reduced using a Riffle splitter or shall be quartered into four approximately equal portions. The two diagonally, opposite quarters shall be combined resulting in two samples. Identify and designate one of the samples as the Quality Companion Sample and set aside. Identify and designate the other resulting sample as the Quality Control Sample. Use the Quality Control Sample for testing.
  - .2 The Quality Control Sample shall be weighed to ensure that the sample so obtained meets the minimum mass required for the ignition test. If the sample does not meet the minimum mass requirements, then the additional materials will be obtained and added to the Quality Control Sample from the Companion Sample. This will be achieved by quartering the Quality Companion sample and adding one quarter of the Quality Companion Sample to the Quality Control Sample.
  - .3 This process is to be repeated for each sample to provide the Quality Acceptance and Appeal Samples.
4. The third sample for appeal purposes shall be set aside and retained in a Contractor-supplied, suitable container labeled with sample location, date sampled, and project information.
5. The Contractor shall deliver the QA and appeal samples to the Departmental Representative for storing.
6. If a sample is taken from the mat, the areas sampled shall be filled with mix immediately after sampling, and shall receive the same compactive effort as the rest of the mat.

### APPENDIX 3

#### BLANK AGGREGATE SAMPLE PREPARATION

1. Blank aggregate samples replicate the Job Mix Formula design aggregate gradation, without asphalt cement and are used to correlate the Department, Contractor, and appeal lab ignition ovens.
2. Twenty-four (24) blanks are required, each weighing  $1900 \pm 1$  gram. This size approximates the size of the mix samples, less the asphalt cement, that will be used for the project's daily Quality Assurance testing.
3. The blanks shall be prepared from bulk aggregate samples (i.e. coarse aggregates, fine aggregates, blend sand, etc. samples) that were produced from the same sources and are the same materials as the aggregates that will be used for the project and have been designated in the Mix Design. 50 – 60 kg of material will be required.
4. The bulk aggregate samples shall first be dried, and then thoroughly blended at the design proportions. The blended material shall then be sieved into each of the individual sieve sizes designated in the Mix Design down to passing 0.075 mm.
5. The aggregate blanks will then be made up from the sieved material, adding proportions from each individual sieve to conform to the estimated dry aggregate JMF gradation within the tolerances specified below. Prepare to additional dry blank samples within the tolerances specified in Appendix 3. Run washed sieve analysis on both samples and using the average passing on the two samples to arrive at a "Target Adjustment", matching the submitted design JMF for the final blank aggregate preparation. Masses of aggregate added shall be done based on the average washed sieve adjustment as described above.
6. Masses of aggregate added shall be within the tolerances specified in Table Appendix 3-A Sieve Size.
7. Samples shall be sealed in cans or bagged in moisture-proof heavy gauge plastic bags, and labeled with the project number, blank number, the preparation date, and a JMF identification number.

**TABLE APPENDIX 3-A SIEVE SIZE**

<b>Sieve Size</b>	<b>Cumulative Mass Tolerance (g)</b>
Pan	0.1
0.075	0.1
0.180	0.1
0.425	0.1
2.00	0.1
4.75	0.1
9.5	0.7
12.5	2
16	3
19	6
25	13
37.5	45

## **APPENDIX 4**

### **IGNITION OVEN CORRELATION PROCEDURE**

1. Asphalt Mix samples are prepared and burned to determine the effect each oven has on the mix.
2. The Contractor and the Department shall each prepare three (3) Asphalt Mix calibration samples by adding AC (provided by the Contractor from the supplier and batch that will be used on the project) to randomly selected aggregate blanks prepared by the Contractor in accordance with Appendix 3.
3. AC shall be added to the blanks at the proportion specified in the accepted JMF, within a tolerance of  $\pm 0.1$  g.
4. Each party shall burn their mix calibration samples in their ignition oven in accordance with ASTM D 6307 to determine their calibration factor.
5. The calibration factors determined above shall be compared and the inter-laboratory correlation determined.
6. Correlation between the Contractor's lab and the Department lab shall be completed, reviewed and mutually acceptable to the Contractor and the Departmental Representative a minimum of one (1) working day prior to placement of any mix.
7. In the event of an appeal on AC Content, the appeal laboratory shall also prepare and burn calibration samples to determine their oven calibration factor.
8. Results from testing of any asphalt mix shall report the measured AC Content and the corrected AC Content after applying the laboratory calibration factor.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Measure supply and installation of Mechanical Seeding in square metres of actual disturbed area seeded.
- .2 Payment for supply and installation of Mechanical Seeding will be under **Unit Price Item 8 –Mechanical Seeding**.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for seed.
- .3 Certificates: recent seed analysis certificate must be provided to Park Canada Project Authority from an accredited laboratory and must be approved before any blending of seed-lots into a mix.
- .4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Delivery and Acceptance Requirements:
  - .1 Labelled bags of seed identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
  - .2 Inoculant containers to be tagged with expiry date.
- .2 Storage and Handling Requirements:
  - .1 Store seed in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 GRASS SEED**

- .1 Seed shall be minimally Certified Canada No. 1 Grade quality seed varieties, in accordance with the Canadian Seeds Act and Regulations, and having a minimum purity of 95% and germination of 80% with a combination of purity and germination that provide a Pure Living Seed of 80%.
  - .1 Mixture composition:
    - .1 25% Adanac Slender Wheatgrass
    - .2 20% Tufted Hairgrass

- .3 20% Rocky Mountain Fescue
- .4 15% Canadian Wild Rye
- .5 10% Green Needle Grass
- .6 10% Hairy Wild Rye
- .2 Seed tags to be retained and given to the Departmental Representative.
- .3 Seed mix shall be free of impurities, disease and invasive or non-native plants including but not limited to Scentless Chamomile, Downy Brome, Smooth Brome and Canada Thistle.
- .2 In packages individually label in accordance with "Seeds Regulations" and indicating name of supplier.
- .3 Free of impurities that would inhibit germination and growth.
- .4 Source seed from producers as close as possible.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

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

#### **3.2 SEED BED PREPARATION**

- .1 Do not perform work under adverse field conditions as determined by Departmental Representative.
- .2 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; in location as directed by Departmental Representative.
- .3 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.
- .4 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated to tolerance of plus or minus 25 mm, surface draining naturally.
- .5 Scarify and decompact fine graded surface approved by Departmental Representative to 25 mm depth immediately prior to seeding.
- .6 Where there is little or no topsoil and seeding is taking place on subsoil or silty clay soil with little organic matter, a manufactured topsoil product or a fertilizer may provide the



necessary organic matter and growth factors to enable good seed germination and establishment. The Departmental Representative may request that the Contractor source and apply a manufactured topsoil product or fertilizer prior to seeding. Manufactured topsoil products typically consist of a blend of sterile plant fibres and peat moss with micronutrients, soil bacteria and fungi that adds organic matter to poor soils. They do not have any significant nutrients (N,P,K) so will not encourage weed growth but they do contain other constituents found in fertile soil to improve growth conditions. Work to supply and install a manufactured topsoil or fertilizer product, if required by the Departmental Representative, will be paid under the Prime Cost Sum.

### **3.3 SEED PLACEMENT**

- .1 Seed all disturbed areas as directed by the Departmental Representative and areas identified on the plans.
- .2 Seed areas outside of the plan limits as directed by the Departmental Representative or the ESO. These areas will generally be in ditches completed in past years that have seen poor germination.
- .3 For mechanical seeding:
  - .1 Mechanical landscape drill seeder ("Brillion" type or equivalent) which accurately places seed at specified depth and rate and rolls in single operation.
  - .2 Use equipment and method acceptable to Departmental Representative.
  - .3 Consolidate mechanically seeded areas by rolling area if soil conditions warrant or if directed by Departmental Representative with equipment approved by Departmental Representative immediately after seeding.
- .4 For manual seeding:
  - .1 Use manually operated drop seeder ("Cyclone" type or equivalent).
  - .2 Use manually operated, water ballast, landscaping type, smooth steel drum roller. Ballast as directed by Departmental Representative.
  - .3 Use equipment and method acceptable to Departmental Representative.
  - .4 Sow half of required amount of seed in one direction and remainder at right angles as applicable.
  - .5 Incorporate seed by harrowing in cross directions with chain harrows or as approved by Departmental Representative or ESO.
- .5 On cultivated surfaces, sow seed uniformly at rate of:
  - .1 10.0 kg/hectare for mechanical seeding.
  - .2 30.0 kg/hectare for manual seeding.
- .6 Blend applications 150 mm into adjacent grass areas to form uniform surfaces.

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

- .2 Final Cleaning: clean in accordance with Section 01 74 11- Cleaning.
  - .1 Clean and reinstate areas affected by Work.
  - .2 Upon completion remove surplus materials, rubbish, tools and equipment.
- 3.5 PROTECTION**
  - .1 Protect seeded areas from trespass until plants are established.
- 3.6 FINAL ACCEPTANCE**
  - .1 Seeded areas will be accepted by Departmental Representative provided that:
    - .1 Areas are uniformly established free of rutted, eroded, bare or dead spots and extent of weeds apparent in grass is acceptable.
  - .2 Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.
- 3.7 MAINTENANCE DURING WARRANTY PERIOD**
  - .1 Perform following operations from time of acceptance until end of warranty period.
    - .1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.

**END OF SECTION**

**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 Supply and installation of subdrain pipe including removal and replacement of topsoil, trenching, disposal of excess materials, supply and installation of drain rock backfill, bedding, granular filter material and geotextile will be measured horizontally in metres installed.
- .2 Payment for subdrain pipe will be under **Unit Price Item 9 – Subdrain Pipe**.

**1.2 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C136-[06], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.
- .3 CSA International
  - .1 CAN/CSA-B1800-[06], Thermoplastic Non-pressure Pipe Compendium.
- .4 U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Inform Departmental Representative of proposed source of bedding and filter materials and provide access for sampling at least 4 weeks prior to commencing work.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for pipes, pipe fittings, tiles, and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Certificates:
  - .1 Submit manufacturer's certification that drain pipe materials meet requirements of this Section.
  - .2 Certification to be marked on pipe.
- .4 Test and Evaluation Reports:
  - .1 Submit manufacturer's test data that drain pipe materials meet requirements of this Section.

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

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Store and protect pipes from damage.
  - .3 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Perforated plastic pipe and fittings complete with filter sock: to CAN/CSA-B1800. Nominal pipe sizes 150 mm.
- .2 Drain rock backfill in accordance with the following requirements:
  - .1 Screened stone or gravel.
  - .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.2.
- .3 Table:

Sieve Designation	% Passing
200 mm	-
75 mm	-
50 mm	-
38.1 mm	-
25 mm	100
19 mm	0-100
12.5 mm	-
9.5 mm	0-5
4.75 mm	0
2.00 mm	-
0.425 mm	-
0.180 mm	-
0.075 mm	-

- .4 Geotextile filter: In accordance with Section 31 32 19.16 - Geotextile soil stabilization.

## **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 subdrain pipe installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 PREPARATION**

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

### **3.3 TRENCHING**

- .1 Complete trenching in accordance with Section 31 23 16 - Excavating.
- .2 Place geotextile fabric in the trench as indicated.
- .3 Place bedding material after approval of trench by Departmental Representative.

### **3.4 BEDDING**

- .1 Place 100 mm layer of bedding material to full trench width as indicated.

### **3.5 INSTALLATION OF SUBDRAIN PIPES**

- .1 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points.
  - .1 Ensure barrel of each pipe is in contact with bed throughout full length.
- .2 Begin laying at outlet and proceed in upstream direction.
- .3 Lay perforated pipes with perforations downwards at 4 o'clock and 8 o'clock positions.
- .4 Lay bell and spigot pipe with bell ends facing upstream.
  - .1 Do not mortar joints.

- .5 Make joints tight in accordance with manufacturer's instructions.
- .6 Surround and cover pipes with drain rock in uniform 150 mm layers.
- .7 Do not place bedding surround and backfill materials in frozen condition.
- .8 Protect sub-drains against flotation during installation.
- .9 Install cleanout connections to surface as indicated, for flushing.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 32 19.01 - Geotextile.

**1.2 MEASUREMENT AND PAYMENT**

- .1 Measure **supply** of pipe culvert in metres in place for each size of pipe.
- .2 Measure **installation** of pipe culvert including excavation and backfill in metres in place for each size, type and class of pipe.
- .3 Measure **supply and installation** of culvert by tunneling and jacking in metres in place.
- .4 No separate payment for:
  - .1 Culvert excavation or additional sub-cut.
  - .2 Clearing trees and brush as required at inlets and outlets to accommodate installation.
  - .3 Supply, loading, hauling, placing, and compacting granular material for culvert bedding and backfill to excavation.
  - .4 Supply and installation of clay plug at km 35.115 culvert installation.
  - .5 Salvaging, stockpiling, drying, and compacting roadway backfill.
  - .6 Importing additional material when required to backfill the road embankment.
  - .7 Levelling and trimming of the embankments and sideslopes of pipe culvert.
  - .8 Landscape, spread, shape, and trim surplus excavated material from excavation onto adjacent land.
  - .9 Load, Haul, and dispose of surplus excavated material not able to be landscaped.
  - .10 Supply and installation of cofferdams and any necessary dewatering prior to placing of bedding.
  - .11 Construction, maintenance and removal of any temporary bypass roads.
  - .12 Removal and disposal of existing culverts where a new culvert is being installed.
  - .13 Removal and disposal of existing culvert markers.
  - .14 Supply and install geotextile fabric in accordance with Section 31 32 19.01 – Geotextile Soil Stabilization.
  - .15 Removing and disposing of beaver dams or debris required for the installation of culverts.
  - .16 Supply and Installation of new culvert markers.
  - .17 Supply and installation of coating to repair culverts.
  - .18 Supply and placement of grout material.
  - .19 Supply and installation of embedment material, dissipation pool and weir at 3600 mm diameter culvert installation at km 35.115.
  - .20 All work associated with the decommissioning of existing culverts to be replaced by tunneling and jacking.
  - .21 Cutting new culverts to amend the length if required.

- .22 Finishing surfacing structure except where commodity is otherwise provided for payment in this contract.
- .5 Payment for supply of pipe culverts will be under **Unit Price Item 10a – Culverts, Supply CSP Culverts** for each size, type and class of pipe.
- .6 Payment for installation of pipe culverts will be under **Unit Price Item 10b – Culverts, Install CSP Culverts** for each size, type and class of pipe.
- .7 Payment for the supply and installation of culverts by tunneling and jacking will be under **Unit Price Item 10c – CSP Culverts, Culvert Installation by Tunneling and Jacking**.

### 1.3 REFERENCES

- .1 ASTM International
  - .1 ASTM C260/C260M-[10a], Standard Specification for Air-Entraining Admixtures for Concrete.
  - .2 ASTM A252-[10], Standard Specification for Welded and Seamless Steel Pipe Piles.
  - .3 ASTM A742-[13], Standard Specification for Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe.
  - .4 ASTM A929-[17], Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process for corrugated Steel Pipe.
  - .5 ASTM C117-[04], Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .6 ASTM C136-[06], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .7 ASTM D4318 – [10e1], Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  - .8 ASTM D698-[07e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft; (600 kN-m/m; )).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.
- .3 CSA International
  - .1 CAN/CSA G401-[07], Corrugated Steel Pipe Products.
  - .2 CAN/CSA W59-[13], Welded steel construction (metal arc welding)
- .4 Canadian Standards Association (CSA International)
  - .1 CSA A23.1/A23.2-[09], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA A283-[06], Qualification Code for Concrete Testing Laboratories.
  - .3 CSA A3000-[13], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .5 Manitoba Infrastructure and Transportation (MIT)
  - .1 MIT, Standard Construction Specifications – 400 – Culverts



- .2 MIT, Standard Construction Specifications – 410 – Jacking Culverts Through Embankments

#### **1.4 MANITOBA INFRASTRUCTURE AND TRANSPORTATION STANDARD**

- .1 Comply with MIT Standard Construction Specifications – 400 – Culverts.
- .2 Comply with MIT Standard Construction Specifications – 410 – Jacking Culverts Through Embankments.
- .3 This section (33 42 13) takes precedence over any contradictory statements made within any of the referenced MIT Specifications sections.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Certification: to be marked on pipe.
- .4 Test and Evaluation Reports:
  - .1 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work.

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

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Store and protect pipes from damage.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan.

### **Part 2 Products**

#### **2.1 CORRUGATED STEEL PIPE (ROUND AND ARCH)**

- .1 Corrugated steel pipe: to CAN/CSA-G401.

- .2 All CSP culverts 1200 mm or less to have Polymer Laminate Coating (min 250 microns thick) to ASTM A742.
- .3 All CSP culverts 3000 mm or more to have Aluminum Type 2 Coating to ASTM A929.
- .4 Corrugated steel pipe: helically corrugated and the ends recorrugated to provide annular corrugations for coupling purposes.
- .5 Minimum length of annular corrugated culvert ends 300 mm.
- .6 Minimum wall thickness to be 2.0 mm for 1200 mm or less in diameter.
- .7 Minimum wall thickness to be 3.5 mm for culverts 3000 mm or greater in diameter.
- .8 Minimum 6 metre section lengths for new culvert installations.
- .9 Corrugations to be 68 mm x 13 mm for culverts 1200 mm or less in diameter.
- .10 Corrugations to be 125 mm x 25 mm for culverts 3000 mm or greater in diameter.

## **2.2 SMOOTH WALL STEEL PIPE**

- .1 New smooth wall steel pipe with minimum wall thickness of 12.5 mm and minimum inner diameter of 1200 mm.
- .2 The pipe shall be manufactured from steel and comply with the requirements of the most recent edition of ASTM Specification A252, Grade 2 or higher.
- .3 Culvert sleeving material shall meet or exceed industry standards and be fit for use for the purpose of a through grade culvert and the installation method used.
- .4 Welding:
  - .1 Welding of smooth wall steel pipe shall only be performed by journeyman welders. All Welders' qualifications shall be current and shall be available for examination by the Departmental Representative.
  - .2 Smooth wall steel pipe sections shall be joined together with a full strength and continuous butt weld which forms a watertight seal in accordance with CSA Standard W59, Welded Steel Construction.
  - .3 When the ambient air temperature is between 0°C and 5°C the Contractor shall pre-heat the smooth wall steel pipe to a minimum of 100°C for a distance of 80 mm beyond the weld in each direction, and shall shelter the section being welded from the wind. When the ambient air temperature is below 0°C the Contractor shall provide suitable hoarding and heating of the sections being welded. The Departmental Representative has the right to require the Contractor to modify or cease the welding operation if, in the opinion of the Departmental Representative, adequate shelter and heating is not being provided during cold weather welding.

## **2.3 GROUT**

- .1 The materials used in production of grout shall confirm to the requirement listed below.

- .1 Portland cement shall confirm to the requirements of CSA A3001 General Use Hydraulic Cement (GU) Type 10.
- .2 Mixing water shall conform to the requirements of the latest version of CSA Standard CAN 3-A23.1.
- .3 Air entraining admixtures if required shall confirm to the requirements of the latest version of ASTM C260.
- .4 Fly ash can be used in the grout mix and shall meet the requirements of Class F or Class C in CSA A3001.
- .5 The fine aggregate will have the following gradation:

Particle Size	Percent Passing
4.75 mm	100
0.075 mm	0 - 3

- .2 The design mix of the grout/ flowable shall confirm to requirements listed below in terms of composition and production.
  - .1 Cementitious Content – Minimum 25% by weight of total cementitious material
  - .2 Slump – 200 to 300 mm
  - .3 Water/Cement Ratio – 1.5 Maximum
  - .4 Air Content – 15 to 25%
  - .5 Unit Weight – 1500 to 2500 kg/m<sup>3</sup>
  - .6 The 28 day compression strength, measured in accordance with CSA A23.2-9C, shall be 0.8 to 2.0 MPa.
- .3 The mix design shall produce a consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place.
- .4 For all applications, the grout mix should be self levelling, requiring no compaction to achieve adequate bearing capacity.
- .5 Delivery storage and handling of the grout material and related equipment shall be in strict compliance with manufacturer's recommendations.
- .6 The above are to be considered as the minimum specifications. The Contract shall provide a mix design to the Departmental Representative one week prior to placement and it shall be subject to the approval of the Departmental Representative.

## 2.4 GRANULAR BEDDING

- .1 Granular bedding material to Section 01 45 00 – Quality Control and following requirements:
  - .1 Crushed pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117.
  - .3 Table:

Sieve Designation	% Passing
37.5 mm	100
4.75 mm	25-85
0.425 mm	15-40

Sieve Designation	% Passing
0.075 mm	6-18

- .4 Oversize material retained on the upper sieve will be permitted to a maximum of 3% of the sample, only if 100% of the oversize material passes the next larger standard sieve size.
- .5 Contrary to MIT – 400, water jetting will not be accepted as a suitable compaction method.
- .6 Other properties as follows:
  - .1 Liquid Limit: to ASTM D4318, Maximum 25.
  - .2 Plasticity Index: to ASTM D4318, Maximum 6.

## 2.5 GEOTEXTILE FILTER

- .1 Geotextile soil stabilization: in accordance with Section 31 32 19.16- Geotextile soil stabilization.

## 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 pipe culvert installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- .2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe. Do not backfill until pipe grade and alignment checked and accepted by Departmental Representative.

### 3.2 PREPARATION

- .1 All work to be in accordance with the EPP, BIA and the specifications.
- .2 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, and waterways according to requirements of sediment and erosion control plan, specific to site, or requirements of authorities having jurisdiction, whichever is more stringent.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

- .3 Beaver dams that are required to be removed to facilitate culvert or beaver deceiver installation shall be removed under the direction of the ESO.
  - .1 Beaver dams are to be removed in such a way as to release water slowly, in 20 cm increments.

### **3.3 INSTALLING CORRUGATED STEEL PIPES**

- .1 Cofferdams
  - .1 Constructed of clean, non-erodible materials such as sand bags, aquadam-type installations, steel or wood walls, concrete blocks, clean rip-rap etc.
  - .2 Earthen fill material containing fine sediments will not be accepted unless, prior to its placement within the watercourse, it is fully contained using a non-erodible material that will prevent the release of sediment throughout installation, use and removal of the cofferdam.
  - .3 Cofferdams to be sealed appropriately to prevent leaking.
  - .4 Stream flows must be maintained through isolation to ensure upstream pooling does not occur. Constant pumping, or a temporary diversion culvert is required.
- .2 Dewatering
  - .1 5 working days' notice to be provided prior to dewatering each fish-bearing culvert site to allow ESO/Departmental Representative to schedule and perform fish salvage.
  - .2 Pump intakes to be fitted with appropriate fish screen.
- .3 Culvert Removal
  - .1 Remove culverts and dispose of sections to an approved location outside of the National Parks.
  - .2 Accommodate traffic at all time during the removal of a culvert. Adequate control and traffic flow to be maintained.
- .4 Bedding
  - .1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.
  - .2 Place geotextile on prepared surface in accordance with Section 31 32 19.16- Geotextile soil stabilization and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
  - .3 Place 300 mm minimum thickness of approved granular material on bottom of excavation and compact to 95% of corrected maximum dry density to ASTM D698 and dry to at least the optimum moisture content.
  - .4 Supply and install clay plug, if required, as shown on site specific culvert installation drawings on upstream end.
  - .5 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding and to camber as indicated or as directed by Departmental Representative, free from sags or high points.
  - .6 Place bedding in unfrozen condition.
- .5 Laying Corrugated Steel Pipe Culverts
  - .1 Begin pipe placing at downstream end.

- .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
- .3 Lay pipe with outside circumferential laps facing upstream and longitudinal laps or seams at side or quarter points.
- .4 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.
- .6 Joints
  - .1 Match corrugations or indentations of coupler with pipe sections before tightening.
  - .2 Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.
  - .3 Insert and tighten bolts.
  - .4 Repair spots where damage has occurred with appropriate coating paint approved in writing by Departmental Representative.
- .7 Backfilling
  - .1 Backfill around and over culverts as indicated or as directed by Departmental Representative.
  - .2 Place backfill material, approved in writing by Departmental Representative, in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
    - .1 Compact each layer to 98% corrected maximum dry density to ASTM D698 taking special care to obtain required density under haunches.
  - .3 Protect installed culvert with compacted fill before heavy equipment is permitted to cross.
  - .4 Remove and replace any culvert material damaged by Contractor's operations at no extra cost.
  - .5 Place backfill in unfrozen condition.
- .8 Surfacing Structure
  - .1 Place 300 mm of Reclaimed/Removed Asphalt Concrete or Granular Base Course "Class A" up to 50 mm below the original roadway surface **for through road culverts.**
    - .1 Compact the layer to 100% corrected maximum dry density to ASTM D698.
    - .2 Place 50 mm of Asphalt Concrete in accordance with Section 32 12 16 – Asphalt Paving (EPS) to the original roadway surface.
  - .2 Place 300 mm of Reclaimed/Removed Asphalt Concrete or Granular Base Course "Class A" up to original approach surface **for approach culverts.**

### 3.4 TUNNELING AND JACKING CULVERTS

- .1 Install smooth wall steel pipe culvert as indicated.
- .2 Cofferdam will be required if there is flow at time of installation.
  - .1 Constructed of clean, non-erodible materials such as sand bags, aquadam-type installations, steel or wood walls, concrete blocks, clean rip-rap etc.

- .2 Earthen fill material containing fine sediments will not be accepted unless, prior to its placement within the watercourse, it is fully contained using a non-erodible material that will prevent the release of sediment throughout installation, use and removal of the cofferdam.
- .3 Cofferdams to be sealed appropriately to prevent leaking.
- .4 Stream flows to be maintained during isolation to ensure upstream pooling does not occur.
- .3 Excavate existing subgrade, clear trees and brush as required at inlets and outlets to accommodate installation.
  - .1 Store excavated material salvageable for reuse at sites which will avoid erosion into streambed.
  - .2 Dispose of surplus excavated material.
- .4 Connect pipe sections by welding in accordance with the specifications.
- .5 Continuously check and ensure that the culvert meets the tolerance requirements for alignment and grade.
  - .1 Finished culvert not to deviate from grade by more than 50 mm, nor from alignment by more than 150 mm.
- .6 Fill voids created between tunnel wall and exterior surface at the completion of tunneling and jacking operations with grout in accordance with the specifications.
  - .1 Method of placing grout subject to approval of Departmental Representative.
  - .2 Maintain sufficient grouting pressure to fill all voids, but not excessive so as to damage the existing Roadway pavement structure and surface.
- .7 Decommission and backfill existing culvert.
  - .1 Remove the existing culvert ends back to a point where the crown of the culvert is covered by a minimum of 0.5 m of roadway embankment.
  - .2 The remaining ends of the existing culverts extending beyond 2.0 m from the edge of the Roadway may also be removed.
  - .3 Dispose of removed culverts offsite.
  - .4 Completely fill with grout the remaining length of the culvert as directed by the Departmental Representative starting at the upstream end.
  - .5 Method of placing grout will be subject to the approval of the Departmental Representative.
  - .6 Maintain sufficient grouting pressure to fill all voids, but not excessive so as to damage the existing Roadway pavement structure and surface.
  - .7 If culvert cannot be completely filled on first attempt, make second attempt the following day after allowing existing grout time to set.
  - .8 The grout cannot be allowed to freeze prior to setting.
  - .9 Upon completion of the decommissioning, backfill, level and trim the embankment side slopes to their original slope, replace topsoil, seed and place permanent erosion and sediment control.
  - .10 Repair any damage to the existing Roadway pavement structure and surface resulting from the decommissioning of the existing culverts.

### **3.5 CULVERT MARKERS**

- .1 Supply and install new end mounted flexible culvert marker post of style Iceworm advantage culvert savers or equivalent on each culvert end for all new culverts.
- .2 Remove and dispose of existing culvert markers outside of the national parks.

### **3.6 RIPRAP ENDWALLS**

- .1 Construct riprap endwalls as indicated on the drawings and as directed by the Departmental Representative.
- .2 Fish-bearing culverts to have thalweg (low flow channel) and dissipation pool delineated through riprap as noted in reference documents and as directed by ESO. Some hand placing of riprap will be required.
- .3 Install outlet dissipation pool and downstream weir through rip-rap, for 3600 mm diameter culvert at km 35.115, as shown on installation drawings, in reference documents and as directed by ESO.

### **3.7 CULVERT EMBEDMENT**

- .1 Install embedment material throughout length of culvert at km 35.115 as shown on installation drawings.
- .2 Embedment material to be supplied by Contractor and consist of the following.
  - .1 25% Boulders - (Good mixture of rock between 300-500 mm in diameter and larger. At least 5 large boulders in the 1000 mm range with 30% of it embedded so as not to move with the high flow).
  - .2 35% Cobble - 50-150mm in diameter
  - .3 15% Gravel
  - .4 25% Fines (Fines should be substrate excavated from around the opening of the culvert, keeping material consistent with the rest of the stream. If additional fines need to be imported, they should be good clay or fine sand).
- .3 Embedment material to consist of natural rounded rock. No crushed aggregate will be accepted.
- .4 After completion of embedment, and while work isolation is still in place, pump culvert full of water to compact and settle embedment materials and remove any suspended fines. Pump work area dry into well vegetated area prior to removing work isolation and finishing installation.

### **3.8 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling.



- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .4 The crushing and burying of existing culverts is not permitted within the project area. The Contractor shall remove and properly dispose of all culverts excavated during the execution of work.
- .5 Clean the entire length of new culverts.
  - .1 The method of removing material must be approved by the Departmental Representative prior to commencement of the Work.
  - .2 Removed material as directed by the Departmental.

**END OF SECTION**