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## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section.

### **1.02 PROJECT DESCRIPTION**

- .1 The project is to repair flood damage to the Legacy Trail that occurred in June of 2013. The work consists of reconstruction of approximately .5 km of asphalt trail, the replacement of the culvert crossing with a precast concrete box culvert and tie-ins to existing trail at the Cascade Junction/Animal Underpass, reconstruction of the link through the animal underpass at the Cascade Junction, reconstruction of 50 m of asphalt trail washed out on the Cascade Ponds Link, repair of the Carrot Creek Pedestrian Bridge at Km 13+381, and the repair/relocation/reinstallation of the pedestrian gates on either side of Cascade Junction.

### **1.03 PROJECT LOCATION**

- .1 The project is located in Banff National Park, just east of the Town of Banff. Km 0+000 of the Banff Legacy Trail is at the start of the trail on the north boundary of the townsite, adjacent to Banff Avenue. The work areas are located on the trail, adjacent to the Trans Canada Highway, just east of the Minnewanka Interchange. The first work area is located between Km 3+400 and Km 4+250 on the Banff Legacy Trail. The second work area is located at the Carrot Creek Bridge, which is at Km 13+381 on the Banff Legacy Trail. The third work area is located on the Cascade Ponds Link, which is a trail that runs north of the Cascade Junction (Km 3+464) to the Cascade Ponds Day Use Area.

### **1.04 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises general reconstruction of sections of the Banff Legacy Trail that was damaged in the June floods in 2013. The trail is located in Banff National Park, just east of the Town of Banff. The work covered under this contract includes but is not limited to the following:
  - .1 Km 3+464 to Km 4+220: Remove damaged/destroyed asphalt from the floodway bed and recover the displaced culverts that were washed downstream for the Cascade Junction crossing.
  - .2 Km 3+464 Cascade Junction/Animal Underpass: Reconstruct the trail crossing over the floodway by either reusing the salvaged culvert from the floodway or supplying and installing new and used 800 mm culvert in the locations indicated on the drawings and reconstructing the trail overtop of the culverts as indicated on the drawings. Reconstruction of the trail will entail resetting of existing concrete lock blocks that were displaced as part of the flooding that hold the existing embankment.
  - .3 Reconstruct a 3 m wide pathway adjacent the west abutment passing through the Cascade Animal Underpass to replace the previously washed out section of trail that connected the Banff Legacy Trail to the

- Cascade Ponds Connector.
- .4 Km 3+464 Pedsetrian/Cyclist Gates on either side of the crossing: Remove and relocate the east gate to Km 4+220 (approx) including the electrical mat power supply. Remove and reinstall the west gate on the west approach to box culvert.
  - .5 Km 3+475 to Km 3+682: Rip Rap existing bank: Trim the existing bank from edge of the trail on a 2:1 slope (approx) and supply and install a 1.2 m thick layer of Class 2 rip rap and geotextile to armour the bank against further erosion.
  - .6 Km 3+682 to Km 4+415: Reconstruct trail: Reconstruct trail to lines and grades indicated. Armour the floodway side of the trail with a 1.2 m thick layer of Class 2 rip rap and geotextile to prevent erosion of the trail.
  - .7 Km 0+200 Cascade Connector: Rebuild approximately 50 m of trail and bank adjacent the floodway to replace the section washed away in the flood.

#### **1.05 CONTRACT METHOD**

- .1 Construct Work under unit price contract.

#### **1.06 WORK SEQUENCE**

- .1 All the Works are to be completed no later than July 30th, 2014
- .2 The Contractor is to maintain public access to the Banff Legacy Trail at all times through the use of detours around the work areas. The Contractor will be responsible for all traffic control required to maintain the detours while they are in force.
- .3 Schedule work progress to allow Departmental Representative unrestricted access to inspect all phases of the Work.

#### **1.7 CONTRACTOR USE OF PREMISES**

- .1 Unrestricted use of site .
- .2 Contractor shall limit uses of the premises for Work, for storage, and for access, to allow:
  - .1 Owner occupancy
  - .2 Work by other Contractors
- .3 Coordinate use of premises under the direction of the Departmental Representative.
- .4 Due to the proximity of the Trans Canada Highway to the work areas, the contractor will be restricted to using only the designated work areas for the execution of the Work. Any requirements to utilize areas outside the designated work areas must be approved in writing by the Departmental Representative prior to use.
- .5 The Contractor will be provided a designated laydown area for the duration of the works. If required, obtain and pay for use of additional storage or work areas needed for operations under this Contract.

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- .6 The Contractor and all Subcontracors shall obtain a business license from the Banff National Park Visitor Information Center in the Town of Banff prior to commencement of the contract.
  - .7 All Contractor's business and private vehicles are required to display a vehicle work pass from Parks Canada. These permits may be obtained free of charge from the PCA Environmental Surveillance Officer or as directed by the Departmental Representative.
  - .8 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
  - .9 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
  - .10 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

#### **1.08 OWNER OCCUPANCY**

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

#### **1.09 OWNER FURNISHED MATERIALS**

- .1 Parks Canada will supply a source of granular material within the park that can be used for reconstruction as general fill material. The Contractor will be responsible for all costs to utilize the material from the source in the construction of the works. All other materials required to complete the Works will be supplied by the Contractor.

#### **1.10 CONSTRUCTION SIGNAGE**

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instructions shall be in both official languages. Graphic symbols shall be diamond grade and shall conform to CAN3-Z321.
- .3 Maintain approved signs and notices in good condition for duration of the project, and dispose of off-site on completion of project or earlier if directed by the Departmental Representative.

#### **1.11 EXISTING SERVICES**

- .1 Notify the Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Establish location and extent of service lines in area of work before starting Work. The Contractor is responsible for all costs associated with

doing locates for services within the work area.

- .3 A fibre optics service that provides the main telecommunications link to the Town of Banff is located within the work area. The Contractor is responsible to protect and maintain continual operation of this line for the duration of the works.
- .4 Where unknown services are encountered, immediately advise the Departmental Representative and confirm findings in writing.
- .5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .6 Record locations of maintained, re-routed and abandoned service lines.
- .7 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures .

#### **1.12 SETTING OUT OF WORK**

- .1 Departmental Representative will establish control points and provide:
  - .1 Initial set of trail centerline location stakes.
  - .2 Detailed cross-section and vertical alignment as part of the drawings.
  - .3 Complete set of Construction Drawings
  - .4 Measurements for Payment (Quantity Surveys)
- .2 Contractor to
  - .1 Set additional control points as necessary
  - .2 Set all work stakes necessary to complete the work.
  - .3 Allow sufficient time to take measurements for payments. The Departmental Representative may need to verify the measurements for payment and the work will be coordinated with the Contractor.
  - .4 Not damage geodetic benchmarks unless authorized by Departmental Representative
- .3 All survey work required by the contractor to layout, monitor, and provide measurements for quantities for payment is considered incidental to the completion of the Works and will not be considered for separate payment.

#### **1.13 DOCUMENTS REQUIRED**

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

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BANFF LEGACY TRAIL FLOOD SUMMARY OF WORK  
REPAIRS  
BANFF NATIONAL PARK  
PROJ NO: BNP13-04-050

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SECTION 01 11 00  
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2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

**1 GENERAL**

- 1.1 PRECEDENCE .1 For Federal Government projects, Division 1**  
Sections take precedence over technical specification sections in other Divisions of this Project Manual.

**1.02 RELATED REQUIREMENTS**

- .1 Section 01 32 18 - Construction Progress Schedules - Bar (Gantt) Chart.
- .2 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours
- .3 Section 01 35 43 - Environmental Procedures

**1.03 EXISTING SERVICES**

- .1 Provide for pedestrian and vehicular traffic for the duration of the Work.

**1.04 USE OF SITE AND FACILITIES**

- .1 The Work Site shall be specified by Parks Canada and shall only be used for the purposes of the Work. The Work Site will be made available by Parks Canada to the Contractor for its non-exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents
- .2 The Contractor must make Private Accommodation Arrangements. Office-tool trailer may be set up at a location designated by the Departmental Representative.
- .3 The Contractor shall keep the Work Site clean and free from accumulation or waste materials and rubbish regardless of the source. Snow shall be removed by the Contractor as necessary for the performance and inspection of the Work.
- .4 The Contractor shall provide sanitary facilities for work force in accordance with governing regulations and the Environmental Procedures for this project. The Contractor shall post notices and take precautions as required by local health authorities and keep area and premises in a sanitary condition.
- .5 Any damage to the Work Site caused by the Contractor shall be repaired by the Contractor at its expense.
- .6 The Contractor may work 12 hours per day, six days per week with the following restrictions:
  - .1 Restricted hours for blasting if required.
  - .2 No hauling of material during inclement weather.
  - .3 No stoppage of traffic will be allowed for the period commencing at 07:00 a.m. on the day before a Statutory Holiday or long weekend to 7:00 a.m. on the day following a long weekend.

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### **1.05 EXISTING SERVICES**

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 There are active utilities within the Trans Canada Highway right-of-way that include a Fibre Optics Buried Line, Telus Phone Line, and a Shaw Cable Line, located within the highway ditch areas and adjacent/underneath the trail in certain locations.
- .3 The locations of Utilities, if any, shown on the drawings are not necessarily exact nor is there any guarantee that all the Utilities in existence within the limits of the Work Site have been shown on the drawings.
- .4 If it is determined by the Departmental Representative that Utilities affected by the permanent Work will be relocated by Others, the Contractor shall co-operate and coordinate as required with Other Contractors engaged in Utility relocation operations on the Work Site.
- .5 The Contractor shall establish and maintain direct and continuous contact with the owners or operators of any Utilities which may interfere with the Work. The Contractor shall cooperate with them at all times and in all places of Work. The Contractor shall keep the Departmental Representative informed of all communications with the Utility companies and authorities.
- .6 The Contractor shall 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.
- .7 Whenever working in the vicinity of Utilities, the Contractor shall locate such Utilities and expose those that may be affected by the Work, using hand labour as required.
- .8 The Contractor shall assess the possible impact of its operations on all Utilities that may be affected by its operations, and shall protect, divert, temporarily support or relocate, or otherwise appropriately treat such Utilities to ensure they are preserved.
- .9 The Contractor shall Immediately report any damage to Utilities to the Departmental Representative and to the Utility company authority affected, and shall promptly undertake such remedial measures as are necessary at no additional cost to the Owner.

### **1.06 SURVEY OF EXISTING PROPERTY CONDITIONS**

- .1 Submission of tender is deemed to be confirmation that the Contractor has inspected the site and is conversant with all conditions affecting execution and completion of the work.
- .2 The Contractor shall regularly monitor the condition of the Work Site throughout the construction period, and shall immediately notify the Owner if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts, and

landscaped areas.

- .3 The Departmental Representative may, but shall not be obligated to survey and record condition of the Work Site and or property on or adjoining the Work Site prior to the commencement of construction by the Contractor. If requested, the Departmental Representative will provide a copy of the survey records to the Contractor for reference.
- .4 Whenever supplied with survey records, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative for any area before commencing construction in that area. Commencement of construction in any area shall be interpreted to signify that the Contractor has accepted such survey records as being a true record of the existing conditions prior to construction.
- .5 The provision of the records of a survey of existing condition by the Departmental Representative shall in no way limit or restrict the Contractor's responsibility to exercise proper care to prevent damage to all property within or adjacent to the Work Site, whether all such property is covered by the survey or not.

#### **1.07 PROTECTION OF PERSONS AND PROPERTY**

- .1 The Contractor shall comply with all applicable safety regulations of the Worker's Compensation Board of Alberta a (WCB) including, but limited to, WCB's Industrial Health and Safety regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations.
- .2 The Contractor shall comply with the Canada Labour Code - Part 2 regulations as it applies to working within a Federal Government Workplace.
- .3 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.
- .4 The Contractor shall promptly take such measures as are required to repair, replace, or compensate for any loss or damage caused by the Contractor to any property, or, if Parks Canada so directs, shall promptly reimburse Parks Canada the costs resulting from such loss or damage.
- .5 If required, blasting shall take place between 11:00 a.m. and 3:00 p.m. The Contractor shall:
  - .1 Notify the Departmental Representative at least 24 hours in advance of each scheduled blast.
  - .2 A list of other parties to be notified in advance of each scheduled blasting will be provided by the Departmental Representative. Contractor to notify these parties at least 24 hrs in advance of each scheduled blasting.
  - .3 Provide traffic management in accordance with Section 01 35 31 - Special Procedures for Traffic Control.

#### **1.08 USE OF PUBLIC AREAS**

- .1 Off-road construction equipment will not be allowed on the existing Trans



Canada Highway except at designated crossing points and loading areas. Steel tracked equipment with cleats will not be allowed on pavement designated for future use. Asphalt, granular, embankment, and excavation materials may be hauled on existing highway but this shall be standard highway trucks not exceeding legal highway load limits.

- .2 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Work Site and entering public roads shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Work Site and transporting materials shall be covered by tarpaulins or other suitable covers. Spills of materials in public areas shall be recovered or cleaned immediately by the Contractor at no cost to the Owner. All activities shall be in accordance with Section 01 35 43 - Environmental Procedures and the Environmental Protection Plan prepared for the project.

#### **1.09 SUPERVISORY PERSONNEL**

- .1 Within five days after award notification, the Contractor shall submit to the Departmental Representative confirmation of the names of the supervisory personnel and other key staff designated for assignment on the Contract. The following personnel shall be included in the list:
  - .1 Project Superintendent
  - .2 Safety representative
- .2 The above personnel shall perform the following duties:
  - .1 The Project Superintendent shall be employed full time and shall be present on the Work Site each and every workday that Work is being performed, from the commencement of Work to Total Performance of the Work.
  - .2 The Project Superintendent shall nominate a Deputy Project Superintendent who shall have the authority of the Project Superintendent during the latter's absence.
  - .3 The Safety Representative shall possess safety experience in general construction. Duties shall encompass all matters of safety activities from commencement or Work until Total Performance of the Work.

#### **1.10 MEETINGS**

- .1 The Work includes attending meetings between the Contractor and the Departmental Representative. The meetings will be called and chaired by the Departmental Representative as required. The Contractor shall be represented at such meetings to the satisfaction of the Departmental Representative.
- .2 The Departmental Representative will schedule an initial meeting held on site after award notification. Senior representatives of the Owner, Departmental Representative, Contractor, major Subcontractors, field inspectors, and supervisors are to be in attendance.
- .3 The Contractor will be requested to assemble his staff and sub-contractors for an environmental briefing to be conducted by Parks Canada. The briefing shall be of approximately 2 hours in duration and held at initial project start-up. The Contractor shall ensure that all his current project staff

in attendance. The Departmental Representative and the Contractor will co-operate in setting the most appropriate time and place for the briefing. Subsequent to the initial environmental briefing, briefings will be arranged for new staff and sub-contractors showing up on the project.

- .4 Cost of attending the above meetings shall be considered incidental to the Unit Price items and no additional payment will be made.

### **1.11 WASTE DISPOSAL**

- .1 All surplus, unsuitable and waste materials shall be removed from the job site to approved sites outside Banff National Park. Refer to Section 01 35 43 - Environmental Procedures and Environmental Protection Plan.
- .2 Deposits of any construction debris into anywaterway are strictly forbidden.
- .3 Cost for Waste Disposal scribed aboveshall be considered incidental to the Unit Price items and no additional payment will be made.
- .4 Waste Disposal shall be completed in accordance with Section 01 35 43 - Environmental Procedures.

### **1.12 WORK STOPPACE**

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

## **2**

### **1.13 PRODUCTS**

- .1 Not Used.

## **3 EXECUTION**

### **3.01 NOT USED**

- .1 Not Used.

**END OF SECTION**

**1 GENERAL**

**1.01 REFERENCES**

- .1 Project General Conditions

**1.02 TENDER BID ITEMS**

- .1 L1.0 - Mobilization/Demobilization
  - .1 The payment for the work required to mobilize and demobilize equipment and labour forces to perform the work.
  - .2 The Contract lump sum payment shall be full compensation for the preparatory work and operations included but limited to, those necessary for movement of personnel, equipment, buildings, shops, offices, supplies and incidentals to and from project sites.
  - .3 Payment will be done in two parts: 50% payable to mobilize the work and 50% payable upon completion of the work and the work site has been returned to Departmental Representative with all works completed.
- .2 L2.0 - Floodway Debris Removal
  - .1 The lump sum payment shall be full compensation for the work to remove broken asphalt from the floodway channel and to recover the 800 mm culverts culverts that were washed out of the Cascade Crossing during the flood, as indicated by the Departmental Representative. The work shall include all labour, equipment, and material costs including loading, hauling, and disposal of the asphalt debris and recovery of the culverts. Disposal of unusable culverts recovered as directed by the Departmental Representative is considered incidental to this item and will not be measured for additional compensation.
- .3 L3.0 - Prime Cost Sum
  - .1 The Prime Cost Sum provided for in the Unit Price Table is not a sum due the Contractor. Rather, payment will be made against it for miscellaneous work not included in the unit price table under the General Conditions of the Contract.
  - .2 Include in Contract Price a Total Prime Cost Sum of \$25,000.
  - .3 Do not include in the Contract Price, additional contingency allowances for products, installation, overhead or profit.
  - .4 Such work may include, but not be limited to:
    - .1 Supply and install of new electro-mats at pedestrian gates, as directed by the Departmental Representative.
    - .2 Additional clearing and grubbing as may be determined by the Departmental Representative
    - .3 Contouring of cut slopes prior to top soiling if different from what was originally staked.
    - .4 Modifying existing/exposed culverts for trail construction not previously identified, as directed by the Departmental Representative
  - .5 Payment for work under the Prime Cost Sum will made using negotiated rates or by material, labour and equipment rates as per the following:
    - .1 Equipment Rental rates will be accordance with current Alberta

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- Road Builders rate schedule, and will be all inclusive and fully operated. Hourly rental of equipment will be measured in actual working time and necessary travel time within the project limits. Transportation time to and from site to be reimbursed only if equipment is used exclusively for additional work.
- .2 Labour rates shall be employee payroll costs plus a 10% mark-up for net profit.
  - .3 Material costs shall be applied at Contractor's cost, including transportation, plus a 10% mark-up for net profit.
- .4 L4.0 - Detour
- .1 The lump sum payment will be for the maintenance removal of the existing pedestrian/cyclist detour around the worksite that is identified on the drawings attached to this contract.
  - .2 Payment to include all labour, equipment and materials required to perform the work. The work the maintenance of the detour for the duration of the work and then the removal, hauling, and placement of the jersey barriers back to the Cascade Pit or as directed by the Departmental Representative.
- .5 U1 - Stripping
- .1 The quantity of Stripping for which payment will be made shall be the volume in cubic meters stripped. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
  - .2 The contract unit price for stripping shall be full compensation for labour, equipment, and materials for excavation, hauling, and stockpiling of the stripped materials, and the loading, hauling, and placing of stripping materials back on contoured slopes as per the requirements of these specifications. No overhaul will be considered for payment and is considered incidental to the work.
- .6 U2 Granular Backfill
- .1 The quantity of Granular Backfill for which payment will be made shall be for the volume in cubic meters of granular backfill placed, approved and accepted by the Departmental Representative. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
  - .2 The contract unit price for Granular Backfill shall be full compensation for labour, equipment, and material to excavate and process the gravel at the source, load and haul to the worksite, and to place and compact as per the requirements of these specifications. No overhaul will be considered for payment and is considered incidental to the work.
  - .3 e gravel source for the granular material will be provided to the Contractor free of charge by the Owner. All other related costs shall be borne by the contractor.
  - .4 As part of the granular backfill, a small quantity of concrete lock blocks that contained the trail embankment prior to the flood will need to be reset as part of the trail construction. The resetting of these blocks is considered incidental to this work item and will not be measured separately for payment.
- .7 U3 - Base Course

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- .1 The quantity of Base Course material for which payment will be made shall be for the volume in cubic meters of base course placed, approved, and accepted by the Departmental Representative. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
- .2 The contract unit price for Base Course shall be full compensation for labour, equipment, and materials to supply, haul, place and compact base course materials as per the requirements of these specifications. No overhaul will be considered for payment and is considered incidental to the work.
- .8 U4 - Class II Riprap
- .1 The quantity of Class II Riprap for which payment will be made is the volume in cubic meters placed, approved and accepted by the Departmental Representative. The quantity shall be determined by measuring the actual slope surface being covered and multiplying the measured area by the specified thickness as indicated on the drawings. Overages in thickness or area beyond the limits shown on the drawings will not be considered for payment unless requested by the Departmental Representative.
- .2 The contract unit price for Class II Riprap shall be full compensation for all materials, royalties, permits, hauling of materials, equipment, tools, labour and incidentals necessary to complete the work, including preparation of subgrade for riprap, geotextile filter fabric, bedding material, trimming, excavation, backfill as required, and labour for measurement.
- .3 The trimming/shaping/excavation of the slope between the Cascade Crossing and the rebuilt section (Stn 3+475 - Stn 3+695) of the trail for placement of riprap as indicated on the drawings is considered incidental to this item and no separate payment for the work to prepare the slope for riprap placement will be considered.
- .9 U5 - Asphalt Paving
- .1 The quantity of Asphalt Paving for which payment shall be made is the area in square meters placed, approved and accepted by the Departmental Representative. The quantity shall be determined by measuring the total length of trail surface and multiplying it by the width of asphalt specified on the drawings.
- .2 The contract unit price per square meter of hot mix Asphalt Trail Surfacing shall include the supply of all asphaltic materials, hauling of the hot asphalt materials for the Plant, the site delivery of the hot mix asphalt materials to the specific trail route location; the complete placement and finish grading work as required to meet the specifications, the complete compaction of the hot mix asphalt materials on the trail route to meet the specifications; the maintenance of the new Asphalt Paving until final approval and acceptance by the Departmental Representative; and any other related work incidental thereto for which separate payment is not elsewhere provided.
- .10 U6 - Culvert Installation
- .1 The quantity of Culvert Installation for which payment shall be made is the total length of 800 mm CSP culvert installed, approved and

accepted by the Departmental Representative. The quantity shall be determined by measuring the total length of culvert installed, measured along the invert of each culvert installed in the locations specified on the drawings and as directed by the Departmental Representative.

- .2 The contract unit price per meter of 800 mm CSP culvert shall include full compensation for labour, equipment, and materials to supply 800 mm CSP culvert and associated couplings and hardware, excavation of subgrade, supply and installation of bedding materials, culvert installation and backfill installation and compaction. Where possible, the salvaged culvert shall be utilized for installation and new culvert is to be purchased only where the salvaged culvert proves unusable. Where the salvaged culvert is used but requires new couplings or hardware, the supply of the required materials is considered incidental to the work and will not be considered for additional payment.
  
- .11 U7 - Gate Installations
  - .1 The quantity of Gate Installations is two gates as indicated on the drawings. A gate consists of one self closing metal pedestrian unit and one two piece metal tube/wire mesh unit.
  - .2 One Gate Installation is the resetting of the West Gate, utilizing as much of the components as possible.
  - .3 The second Gate Installation is the supply and installation of a new gate at the location specified on the drawings.
  - .4 The contract unit price per gate shall include full compensation for labour, equipment, and materials to salvage, repair, and reinstall all components of the West Gate in it's original location, and to supply and install all new components of the East Gate at the location specified on the drawings and with the components as specified on the drawings.
  
- .12 U8 - Seeding
  - .1 The quantity of seeding for which payment shall be made is the total square meters of mechanical, hydraulic, or hand seeding installed, approved and accepted by the Departmental Representative. The quantity shall be determined through measurement of the square area defined by the limits indicated on the drawings or as directed by the Departmental Representative.
  - .2 Payment for seeding shall be full compensation for all labour, equipment, materials and incidentals required to place materials in accordance with the requirements of the Specifications, Drawings and direction of the Departmental Representative.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

END OF SECTION

**1 GENERAL**

**1.01 RELATED SECTIONS**

- .1 Section 01 11 00 - Summary of Work

**1.02 DESCRIPTION**

- .1 Mobilization and Demobilization consists of the preparatory work and operations including but not limited to, those necessary for the movement of personnel, equipment, buildings, shops, office, supplies and incidentals to and from the project sites.
- .2 Any protective measures or movement of the Contractor 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.

**1.3 MEASUREMENT PROCEDURES**      1. Payment shall be made under "Lump Sum PriceItem 1 - Mobilization / Demobilization".

- .1 50 % of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete.
- .2 The remainder of the Lump Sum Contract 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.

**2 PRODUCTS**

**2.01 PRODUCTS**

- .1 Not Used

**3 EXECUTION**

**3.01 EXECUTION**

- .1 Not Used

**END OF SECTION**



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## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 11 00 - Summary of Work.
- .2 Section 01 14 00 - Work Restrictions
- .3 Section 01 33 00 - Submittal Procedures

### **1.02 ADMINISTRATIVE**

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative .
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative .
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

### **1.03 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 Senior representatives of Departmental Representative , Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Agenda to include:
  - .1 Appointment of official representative of participants in the Work.
  - .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
  - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal

- 
- Procedures.
  - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
  - .5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures .
  - .6 Traffic control procedures and detours.
  - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
  - .8 Owner provided products.
  - .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .10 Monthly progress claims, administrative procedures, photographs, hold backs.
  - .11 Appointment of inspection and testing agencies or firms.
  - .12 Insurances, transcript of policies.

#### **1.04 PROGRESS MEETINGS**

- .1 During course of Work, schedule progress meetings weekly.
- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .4 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Review of off-site fabrication delivery schedules.
  - .5 Review Traffic Control and Emergency response Protocol issues.
  - .6 Corrective measures and procedures to regain projected schedule.
  - .7 Revision to construction schedule.
  - .8 Progress schedule, during succeeding work period.
  - .9 Review submittal schedules: expedite as required.
  - .10 Maintenance of quality standards.
  - .11 Review proposed changes for affect on construction schedule and on completion date.
  - .12 Other business.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

## 1 GENERAL

### 1.01 RELATED REQUIREMENTS

- .1 Section 01 11 00 - Summary of Work.
- .2 Section 01 14 00 - Work Restrictions

### 1.02 MEASUREMENT PROCESURES

- .1 This work shall be incidental to the contract and will not be measured for payment.

### 1.03 REFERENCES

- .1 Definitions:
  - .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
  - .2 Bar Chart (Gantt chart): 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.
  - .3 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.
  - .4 Duration: total number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element.
    - .1 Usually expressed as workdays or work weeks.
  - .5 Master Plan: summary-level schedule that identifies major deliverable; work breakdowns structure and key milestones.
  - .6 Milestone: significant point or event in Project, usually completion of major deliverable.
  - .7 Project Planning, Monitoring and Control System: overall system operated to enable monitoring of Project Work in relation to established milestones.
  - .8 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.
  - .9 Work Breakdown Structure (WBS): deliverable-oriented hierarchical decomposition of Work to be executed by contractor to accomplish project objectives and create required deliverables. It organizes and defines total scope of Project. Each descending level represents an increasingly detailed definition of Project Work. WBS is decomposed into Work packages.

### 1.04 ADMINISTRATIVE REQUIREMENTS

- .1 Ensure the Project Schedule is practical and remain within specified Contract Duration.
- .2 Ensure all the Work required for the Contract is identified in the Project

Schedule. Refer to Section 01 11 00 Summary of Work for a potential list of activities.

- .3 As part of the Project Schedule, differentiate the 3 main work areas as separate groups with their related tasks within the master Schedule. The three work areas are defined as the following:
  - .1 Trail Earthworks Reconstruction - Km 3+464 to Km 4+220 and the Cascade Ponds Link
  - .2 Cascade Junction Box Culvert and Underpass trail link - Km 3 + 464
  - .3 Carrot Creek Pedestrian Bridge Repairs - Km 13+381
- .4 Plan to complete Work in accordance with prescribed Project Schedule.
- .5 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
- .6 Include the requirements of Section 01 14 00 - Work Restrictions and Section 01 35 43 - Environmental Procedures.

#### **1.05 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit 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.

#### **1.06 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule
  - .1 Completion of each Stage of Construction within each work area.
- .2 Interim Certificate (Substantial Completion): September 30, 2015
- .3 Contract Completion: October 30, 2015

#### **1.07 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as a 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.

### **1.08 DETAIL SCHEDULE**

- .1 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Plan.
- .2 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.
- .3 Ensure detailed Project Schedule includes as minimum milestones and activity types as follows:
  - .1 Award
  - .2 Permits
  - .3 Submittals
    - .1 Project Schedule
    - .2 List of subcontractors, suppliers, and consultants
    - .3 Contractor Chain of Command including Sub-Contractors and consultants
    - .4 Work Plan
    - .5 Environmental Protection Plan
    - .6 Traffic Management Plan
    - .7 Site Access / Detour Plan
    - .8 Emergency Responce Protocol
    - .9 Site Specific Health and Safety Plan
    - .10 Quality Control Plan
  - .4 Mobilization
  - .5 Work Activities grouped by Work Area
  - .6 Interim Inspection
  - .7 Site Clean-up / Demobilization

### **1.09 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE**

- .1 Allow 5 work days for review by Departmental Representative of proposed construction Detail Schedule.
- .2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within 5 work days.
- .3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.
- .4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

### **1.10 PROGRESS MONITORING AND REPORTING**

- .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.
- .2 Perform Detail Schedule update monthly with status dated (Data Date) on

last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

- .3 Submit to Departmental Representative copies of updated Detail Schedule.
- .4 Requirements for monthly progress monitoring and reporting are basis for progress payment request.
- .5 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
  - .1 Description of progress made.
  - .2 Pending items and status of: shop drawings, change orders, possible time extensions.
  - .3 Status of Contract completion date and milestones.
  - .4 Current and anticipated problem areas, potential delays and corrective measures.

#### 1.11 PROJECT MEETINGS

- .1 Discuss Projectr Schedule at regular site 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 the baseline schedule.

## 2 PRODUCTS

### 2.01 NOT USED

- .1 Not used.

## 3 EXECUTION

### 3.01 NOT USED

- .1 Not used.

END OF SECTION

**1 GENERAL**

**1.01 RELATED SECTIONS**

- .1 Section 01 14 00 - Work Restrictions.
- .2 Section 01 32 18 - Construction Progress Schedules - Bar (Gantt) Chart
- .3 Section 01 35 30 - Health and Safety Requirements
- .4 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours
- .5 Section 01 35 43 - Environmental Procedures
- .6 Section -1 45 00 - Quality Control
- .7 Section 01 78 00 - Closeout Submittals

**1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

**1.03 ADMINISTRATIVE**

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



- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.

#### **1.04 SHOP DRAWINGS AND PRODUCT DATA**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Alberta.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 14 days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .8 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

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- .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Setting or erection details.
    - .4 Capacities.
    - .5 Performance characteristics.
    - .6 Standards.
    - .7 Relationship to adjacent work.
  - .9 After Departmental Representative's review, distribute copies.
  - .10 Submit six (6) prints and one (1) electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
  - .11 Submit six (6) copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
  - .12 Delete information not applicable to project.
  - .13 Supplement standard information to provide details applicable to project.
  - .14 If upon review by Departmental Representative no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
  - .15 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
    - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
    - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

#### **1.05 SAMPLES**

- .1 Not Used.

#### **1.06 MOCK-UPS**

- .1 Not Used.

### 1.07 CERTIFICATES AND TRANSCRIPTS

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

### 1.08 REQUIRED CONTRACTOR SUBMITTALS

- .1 This Clause identifies the plans, programs, and documentation required prior to mobilization on site and during the construction phase.
- .2 **Pre-Mobilization Submittals**
  - .1 Submit the following plans and programs to the Departmental Representative for review a minimum of twenty (20) days prior to mobilization to the project site. The Contractor shall not begin any site work until the Departmental Representative has authorized acceptance of the submittals in writing.
  - .2 The Contractor shall not construe the Departmental Representative's authorization of submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.
    - .1 Project schedule, detailing the schedule of the workdays required from the Contractor, subcontractors, supplier and consultants to complete each activity of the project location in order to meet stages specified in Section 01 11 00. In addition for each activity, critical elements that could impact on the schedule to be identified. Submission shall include both a paper copy of the schedule and an electronic copy in Microsoft Projects format.
    - .2 List of subcontractors, suppliers, and consultants, their role and their key personnel, including names and positions, addresses, telephone and cellular telephone numbers.
    - .3 Contractor Chain of Command, listing key Contractor personnel, including for each name, position, qualification, experience, telephone, and cellular telephone numbers. The list shall include names and telephone/cellular numbers for contact persons who are available on a 24-hour basis in the event of emergencies.
    - .4 Work Plan, describing in detail for each activity by work area the contractor's intended methods of construction, and materials, equipment, and manpower he will use to meet stages specified in Section 01 11 00. The Work Plan has to be linked to the Project Schedule.
    - .5 Quality Control Plan in accordance with Section 01 45 00 - Quality Control.
    - .6 Traffic Management Plan in accordance with requirements of

- 
- Section 01 35 31 - Special Procedures for Traffic Control.
- .7 Environmental Protection Plan (EPP) and Environmental Construction Operations Plan (ECO) which shall meet the requirements of Section 01 35 43 - Environmental Procedures.
  - .8 Site Access and Detour Plans. It shall include but not be limited to, engineered Drawings and procedures for accessing all areas of Work or for proposed detours.
  - .9 Survey Plan describing the Contractor's intended methods of surveying during this project.
  - .10 Contractor shall develop an "Emergency Procedures Protocol" in consultation with Parks Canada. Parks Canada will supply the Contractor with a template with contact names and numbers to be used for this purpose.
  - .11 Health and Safety Plan - The Contractor shall have a Certificate of Recognition (COR) or Registered Safety Plan (RSP) including a site specific Health and Safety Plan acceptable to the Departmental Representative. The Contractor shall implement and maintain the Health and Safety Plan during the Work.
  - .12 Health and Safety Plan must include:
    - .1 Contractor's safety policy
    - .2 Identification of applicable compliance obligations.
    - .3 Definition of responsibilities for project safety/organization chart for project
    - .4 Site specific hazard assessment
    - .5 General safety rules for project
    - .6 Job specific work procedures.
    - .7 Inspection policy and procedures.
    - .8 Incident reporting and investigation policy and procedures.
    - .9 Occupational Health and Safety meetings.
    - .10 Occupational Health and Safety communications and record keeping procedures.
    - .11 Results of safety and health risk or hazard analysis for site tasks and operation.
  - .13 Submit copies of Material Safety Data Sheets (MSDS)
  - .14 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.
  - .15 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .3 The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of the submittals in writing.
- .2 **Construction Phase Submittals.**
- .4 Monthly Progress Reports in accordance with Section 01 32 18.
  - .5 Weekly Progress Reports that outline the detailed Work (Contractor, subcontractors, suppliers, consultants) completed to date as well as the anticipated Work to be performed the following week on a day-to-day basis. Work to be linked to activities by area or location identified in project schedule and to provide information on

materials, equipment and manpower. Also, alternate Work to be identified if work or a portion of, proposed cannot be done due to weather, equipment breakdown, delays in delivery, etc.

- .6 Quality Control Inspection Reports - The Contractor shall maintain a daily inspection report that itemizes the results of all Quality Control inspections conducted by the Contractor. The reports shall be made available for review by the Departmental Representative upon request. A summary of all Quality Control Inspections conducted to date shall be submitted by the Contractor with each request for payment.
  - .7 Shop Drawings and Mix Designs - The Contractor shall submit all shop drawings and mix designs required to fabricate and/or conduct the work a minimum 30 days prior to fabrication/production.
  - .8 Submit four (4) copies of Contractor's authorized representative's work site health and safety inspection reports to the Departmental Representative and authority having jurisdiction, weekly.
  - .9 Submit copies of reports or directions issued by Federal or Provincial health and safety inspections.
  - .10 Submit copies of incident and accident reports.
- .3 **Project Completion Submittals**
- .1 Shop Drawings - The Contractor shall submit copies of all Contractor's Drawings revised as necessary to record all as-builts to the Work and the Contractor shall submit a set of Contract Drawings clearly marked as record as-built changes to the Work. The drawings are to be submitted in electronic AutoCad (.dwg) format.
  - .2 Quality Control Records - The Contractor shall submit a bound and itemized set of project quality control records.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

## **3 EXECUTION**

### **3.01 NOT USED**

- .1 Not Used.

**END OF SECTION**

**1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 14 00 - Work Restrictions.
- .2 Section 01 33 00 - Submittal Procedures
- .3 Section 01 35 43 - Environmental Procedures

**1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the contract and will not be measured for payment.

**1.03 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS)
- .3 Province of Alberta
  - .1 Occupational Health and Safety Act, R.S.A. - Updated 2013.

**1.04 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit 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 found in work plan.
  - .3 Contractor's Safety Policy.
  - .4 Definitions of responsibilities for project safety/organization chart for project.
  - .5 General safety rules for project.
  - .6 Job specific safe work procedures.
  - .7 Inspection policy and procedures.
  - .8 Incident reporting and investigation policy and procedures.
  - .9 Occupational Health and Safety meetings.
  - .10 Occupational Health and Safety communication and record keeping procedures.
- .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, Provincial and

Territorial health and safety inspectors.

- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets to Departmental Representative.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative .
- .8 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.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

#### **1.05 FILING OF NOTICE**

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

#### **1.06 SAFETY ASSESSMENT**

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

#### **1.07 MEETINGS**

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

#### **1.08 REGULATORY REQUIREMENTS**

- .1 Do Work in accordance with the National Parks Act.

#### **1.09 PROJECT/SITE CONDITIONS**

- .1 Work at site will involve contact with Alberta Occupational Health and Safety

#### **1.10 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

### **1.11 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.

### **1.12 COMPLIANCE REQUIREMENTS**

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

### **1.13 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 Province having jurisdiction and advise Departmental Representative verbally and in writing.

### **1.14 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 and bridge 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.

### **1.15 POSTING OF DOCUMENTS**

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



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### **1.16 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.

### **1.17 BLASTING**

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.
- .2 Production of blasting powder must be done in accordance with Section 01 35 43 - Environmental Procedures.
- .3 Do blasting operations in accordance with Section 31 24 14 - Roadway Excavation, Embankment and Compaction.

### **1.18 POWDER ACTUATED DEVICES**

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

### **1.19 WORK STOPPAGE**

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

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not used.

## **3 EXECUTION**

### **3.01 NOT USED**

- .1 Not used.

**END OF SECTION**

## 1 GENERAL

### 1.01 RELATED REQUIREMENTS

- .1 All Division 01, 02, and 03 Sections

### 1.02 MEASUREMENT PROCEDURES

- .1 Cost of Special Procedures for Traffic Control and Construction Detours described in the Section 01 35 31 shall be considered incidental to "**Granular Backfill Gravel** " and no additional payment will be made for the duration of the Contract.

### 1.03 REFERENCES

- .1 Alberta Infrastructure and Transportation Traffic Accommodation in Work Zones.
- .2 Manual of Uniform Control Devices for Canada, (MUTCD) distributed by Transportation Association of Canada.

### 1.04 GENERAL

- .1 The Contractor shall develop and implement a Traffic Management Plan in accordance with the requirements of the current edition of the Alberta Transportation Standard - Traffic Accommodation in Work Zones, except where specified otherwise. The Traffic Management Plan will include plans specific to each detour required for this project.
- .2 The Contractor shall design, supply, erect, move and maintain all traffic control devices, signs and other safety measures and provide staff to ensure safe passage of all traffic from commencement of site work to date of acceptance by the Departmental Representative.
- .3 All temporary signs that are used for longer than one day shall be mounted on wood posts.
- .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 The Contractor shall coordinate traffic management procedures with any other Contractors working in the area.

### 1.05 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.

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- .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 in accordance with instructions contained in Part D of Manual of Uniform Traffic Control Devices.
  - .4 Keep travelled way graded, free from pot holes and of sufficient width to accommodate two 3.7 m wide lanes of traffic, one in each direction.
  - .5 The Contractor shall also provide competent supervision and/or contract personnel as required during non-working hours to ensure that safety flares, flashing beacons, signs, lights, etc. are in proper working order.
  - .6 The traffic control measures will be monitored by the Departmental Representative, and he may require modifications of these measures from time to time to achieve satisfactory traffic flow, safety of traveling public, and coordination with adjacent contracts.
  - .7 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.
  - .8 The Contractor shall maintain a clean, dust free construction zone by means of brooming and watering as required.

#### **1.06 INFORMATIONAL AND WARNING DEVICES**

- .1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices specified in the Traffic Management Plan submitted by the Contractor and approved by the Departmental Representative.
- .3 Place signs and other devices in locations recommended in Alberta Infrastructure and Transportation's Standard Traffic Accommodation in Work Zones. Provide intermittent signage if work zones exceed 2.0 km in length.
- .4 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Departmental Representative.
- .5 Signs shall be wind resistant.
- .6 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.

### 1.07 CONTROL OF PUBLIC TRAFFIC

- .1 Provide competent flag personnel, trained in accordance with, and properly dressed and equipped to Alberta Infrastructure and Transportation's Standard Traffic Accommodation in Work Zones 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 vehicles are entering or exiting Worksite access roads.
  - .3 When vehicles are entering or exiting Gravel pits or sources in the park.
  - .4 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.
  - .5 Where temporary protection is required while other traffic control devices are being erected or taken down.
  - .6 For emergency protection when other traffic control devices are not readily available.
  - .7 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
- .2 Delays to public traffic due to Contractor's operations: maximum 20 minutes, except during blasting operations at which time the Contractor may delay public traffic up to 45 minutes between the hours of 11:00 a.m. and 3:00 p.m.
- .3 No stoppage of traffic will be allowed for the period commencing at 07:00 a.m. on the day before a Statutory Holiday or long weekend to 7:00 a.m. on the day following a long weekend.
- .4 During hours of darkness, the Contractor shall determine requirements but as a minimum, flag persons shall be additionally equipped with a red signal hand-light of sufficient brightness to be clearly visible to approaching traffic and flagging stations shall be illuminated by overhead lighting. Signs indicating hazardous conditions and signs requiring increased attention shall be marked with flashers.

### 1.08 OPERATIONAL REQUIREMENTS

- .1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic to be restricted as follows:
  - .1 Speed limit reduced to 50 km/h in workzones in work periods.
  - .2 Speed limit reduced to 50 km/h on detours.
- .2 Maintain existing conditions for traffic crossing right-of-way.
- .3 No stoppage of traffic shall be allowed during inclement weather conditions.

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BANFF LEGACY TRAIL FLOOD  
REPAIRS  
BANFF NATIONAL PARK  
PROJ NO: BNP13-04-050

SPECIAL PROCEDURES FOR  
TRAFFIC CONTROL AND  
CONSTRUCTION DETOURS

SECT 01 35 31  
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2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 All Divisions 01,02, 03 and 30 Sections.

### **1.02 PRECEDENCE**

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

### **1.03 MEASUREMENTS PROCEDURES**

- .1 Preparation and implementation of an Environmental Protection Plan in accordance with this Section 01 35 43 - Environmental Procedures will not be measured separately for payment will be considered incidental to the work.

### **1.04 NATIONAL PARK REGULATIONS**

- .1 The Contractor shall ensure all work is performed in accordance with the ordinances, laws, rules and regulations set out in the Canada National Parks Act and Regulations.
- .2 The Contractor and any sub-contractors shall obtain a business license from the Parks Canada Administration Office in Banff, prior to commencement of the contract.
- .3 All Contractor's vehicles are required to display a vehicle pass from Parks Canada. These permits may be obtained free of charge from the Departmental Representative, PCA Surveillance Officer or at the Park Gate.

### **1.05 CANADIAN ENVIRONMENTAL ASSESSMENT ACT**

- .1 Execution of the work is subject to the provisions within the Canadian Environmental Assessment Act (CEAA) Guidelines Order of 2003 and subsequent amendments. The Banff Legacy Trail Project has been subject to an environmental assessment - "Environmental Assessment for the Banff Legacy Trail: Multi use Recreational Trails from Harvie Heights to Banff and Vermilion Lakes to the 1A Highway", pursuant to the expectations of the CEAA. Environmental Protection Plans are the next step to achieve the desired end results of minimal adverse environmental effect as the project is constructed.
- .2 Failure to comply with or observe environmental protection measures as identified in these specifications may result in the work being suspended pending rectification of the problems.

### **1.06 ACTION AND INFORMATIONAL SUBMITTALS**

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

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- .2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.
  - .3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
  - .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
  - .5 Include in Environmental Protection Plan:
    - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
    - .2 Descriptions of environmental protection personnel training program.
    - .3 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan.
    - .4 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
    - .5 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
    - .6 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
    - .7 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.
    - .8 Waste Water Management Plan identifying methods and procedures for management.
    - .9 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

#### **1.07 START-UP AND ENVIRONMENTAL BRIEFING**

- .1 All staff employed at the construction site will be subject to an approximately two hour briefing regarding their individual and collective responsibilities to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. Employees must attend this briefing before beginning their work at the site. Each employee, having received the briefing, will be issued a certification sticker to be displayed on their helmet. It is recognized new employees may join the Contractor's workforce 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 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 at 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 workforce at the site.

- .2 Parks Canada will have an ESO attending the site to monitor the construction activity for conformance with the EPP. 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.

**1.8 CONSTRUCTION  
SITE ACCESS AND  
PARKING**

1. Points of access from the existing TCH to the trail construction sites will be required. The Contractor shall review both short and long term construction access requirements with the Departmental Representative, both at start-up and on an ongoing basis. In consultation with the Departmental Representative, the Contractor shall formulate an agreement for worker transportation to and from the work sites and where workers shall park their private vehicles. Generally, personal vehicles shall be parked at least 10 metres distance from any watercourse.

- .1 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by worker's vehicles or construction machinery and shall instruct workers so that the "footprint" of the project is kept within defined boundaries.

**1.09 SITE MANAGEMENT**

- .1 The Contractor is to prepare an EPP which details how the work limits shall be marked and what procedures will be employed to ensure trespass outside these limits does not occur, to the satisfaction of the Departmental Representative and the ESO.
- .2 The Contractor shall control blowing dust and debris generated from the construction site by means such as covering or wetting down materials and rubbish. Dust control measures for temporary access roads mat also have to initiated.
- .3 Security services at the construction site may be desirable or necessary during the contract, especially during quiet times. Fuel tanks and other potentially deleterious substance containers must be secured by the Contractor to ensure they are tamperproof and cannot be drained by vandals.
- .4 Pets shall not be brought to or maintained at the construction site.



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### **1.10 FIRES, FIRE PREVENTION AND CONTROL**

- .1 Fires and burning of rubbish on site is not permitted.
- .2 A fire extinguisher shall be carried and available for use on each machine. Basic fire fighting equipment recommended (e.g.. a water truck, minimum 500 imperial gallons with 500 feet of fire hose and a pump capable of producing 45 psi water pressure at the nozzle, three shovels, two pulaskis, and two five gallon backpack pumps) shall be maintained at the construction site at location known and easily accessible to all the Contractor's staff. Contractor's staff shall receive basic training in early response to wildfire events during the "environmental briefing".
- .3 The Departmental Representative will indicate possible sources of water for filling the water truck, It will be the Contractor's responsibility to then gain access to a recommended water source and bear all costs for it's use.
- .4 Construction equipment shall be operated in a manner and with all original manufacturer's safety devices to prevent ignition of flammable materials in the area.
- .5 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented.
- .6 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The ESO and the Departmental representative shall be notified of any fire immediately. If not available, Banff Dispatch shall be contacted qt (403) 762 4506

### **1.11 EROSION CONTROL**

- .1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan and the EPP .
- .2 The regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. If the design of the control measures is not functioning effectively they are to be repaired. The Departmental Representative and ESO also will monitor erosion control and performance.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

### **1.12 EQUIPMENT MAINTENANCE, FUELLING AND OPERATION**

- .1 The Contractor shall ensure that all soil and any debris attached to the construction equipment to be used on the project site shall be removed (e.g. power washing) outside the Banff National Park before delivery to the work site.
- .2 Equipment fuelling sites will be identified by the Contractor and approved

by the Departmental Representative and the ESO. Except for chain saws, any fuelling closer than 100 meters to the Bow River or any other streams, wetlands, water bodies or waterways shall required authorization and oversight of the Departmental Representative.

- .3 Diesel and gasoline delivery vehicles, including bulk tankers shall be parked more than 100 meters from the Bow River or any other streams, wetlands, water bodies or waterways. Gravity fed fuel system are not allowed. Manual or electric pump delivery systems shall be used. Fuelling personnel shall maintain presence at and immediate attention to the fuelling operation.
- .4 Mobile fuel containers (e.g. slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Protection and containment of approved fuel storage sites is addressed in Part 1.14 of this Section.
- .5 Equipment used on the project shall be fuelled with E10, and low sulphur diesel fuels and shall conform to local emission requirements. The Contractor is to ensure the unnecessary idling of vehicles is avoided.
- .6 Oil changes, lubricant changes, greasing and machinery repairs shall be performed at locations approved by the ESO or the Departmental Representative. Waste lubrication products (e.g. oil filters, used containers, used oil, etc.) shall be secured in spill-proof containers and properly recycled or disposed at an approved facility. No waste petroleum, lubricant products or related materials are to be discarded, buried or disposed of in borrow pits, turnouts, picnic areas, viewpoints, etc anywhere within Banff National Park.
- .7 The Contractor shall ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working order.
- .8 Fuel containers and lubricant products shall be stored only in secure locations specified by the Departmental Representative. Fuel tanks or other potentially deleterious substance containers shall be secured to ensure they are tamperproof and cannot be drained by vandals when left overnight in Banff National Park.

### **1.13 OPERATION OF EQUIPMENT**

- .1 Equipment movements shall be restricted to the "footprint" of the construction area. The work limits shall be identified by stake and ribbon or other methods approved by the Departmental Representative. Unless authorized by the Departmental Representative, activities beyond the work limits are not permitted. No machinery will enter, work in or cross over streams, rivers, wetlands, water bodies or watercourses, nor damage aquatic and riparian habitat or trees and plant communities. Some construction shall require working close to watercourses or water bodies. In these instances, the Contractor is to describe measures to be employed to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) do not enter any watercourses, to the satisfaction of the Departmental Representative and ESO.
- .2 The Contractor shall instruct workers to prevent pushing, placement, leveling, storage or stockpiling of any materials in the trees bordering

the right of way or into watercourses or water bodies.

- .3 When, in the opinion of Parks Canada, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at his or her expense, for complete restoration including replacement **o f trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative and ESO.**
- .4 Workers private vehicles are to remain within the construction footprint.

#### **1.14 WILDLIFE**

- .1 During the Environmental Briefing all personnel shall be instructed by the ESO on procedures to follow in the event of wildlife appearance near or within the work site and any other wildlife concerns.
- .2 If necessary, the construction activity may be scheduled around important wildlife windows. Specific windows may involve Harlequin Ducks and/or fish, depending on the location of the worksite. The Departmental Representative will advise if any apply.
- .3 Avoid or terminate activities on site that attract or disturb wildlife and vacate the area and stay away from the immediate location if bears, cougars, wolves, elk or moose display aggressive behaviour or persistent intrusion. Extra care to control materials that might attract wildlife (e.g. lunches and food scraps) must be exercised at all times.
- .4 Notify the ESO and Departmental Representative immediately about dens, litters, nests, carcasses (road kills), bear activity or encounters on or around the site or crew accommodation. Other wildlife related encounters are to be reported within 24 hours. If the ESO or Departmental Representative are not available, Banff Dispatch will be contacted at (403) 762 4506.

#### **1.15 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies or watercourses the would result in damage to aquatic and riparian habitat. Hazardous or toxic products shall be stored no closer than 100 metre from the Bow River.
- .3 A Spill Response Plan will be prepared as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative and the ESO and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand

blasting agents.

- .4 The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products shall be in accordance with all applicable federal and provincial legislation.
- .5 An impervious berm shall be constructed around fuel tanks and any other potential spill area. The berm shall be capable of holding 110% of tank storage volumes and shall be to the satisfaction of the Departmental Representative and the ESO before start-up. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double lined fuel tanks can prevent spills into the environment.
- .6 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work by methods that are approved by the Departmental Representative or ESO.
- .7 The Contractor shall provide spill kits at re-fuelling, lubrication, and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The ESO and Departmental Representative prior to project start-up must approve these spill kits. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
- .8 Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative and the ESO shall be notified immediately of any spill. If not available, Banff Dispatch will be contacted at 403 762 4506. Spill response cards will be distributed during the initial Environmental Briefing with basic instructions and phone numbers.
- .9 In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
- .10 The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill condition), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the expected standard and to the satisfaction of the Departmental Representative and ESO.

#### **1.16 HISTORICAL/ ARCHAEOLOGICAL CONTROL**

- .1 Artifacts, relics, antiquities and items of historical interest such as cornerstones, commemorative plaques, inscribed tablets and similar objects found on the work site shall be reported to the ESO or Departmental Representative immediately. The Contractor and workers shall wait for instructions before proceeding with their work.
- .2 All historical or archaeological objects found in Banff National Park are protected under the National Parks Act and Regulations and are the property of Parks Canada. The Contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative.

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## **1.17 WASTE MATERIALS STORAGE AND REMOVAL**

- .1 The Contractor and workers shall dispose of hazardous wastes in conformance with the Canadian Environmental Protection Act.
- .2 All wastes originating from construction, trade, hazardous and domestic source, shall not be mixed, but will be kept separate.
- .3 Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried, or discarded at the construction site or elsewhere in Banff National Park. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed of at an appropriate waste landfill site or recycler located outside the park. Construction waste storage containers, provided by the Contractor, shall be emptied by the Contractor when 90% full. Waste containers will have lids, and waste loads shall be covered while being transported.
- .4 A concerted effort shall be made by the Contractor and Workers to reduce, reuse, and recycle materials.
- .5 All efforts to prevent wildlife from obtaining food, garbage, or other domestic wastes shall be made by the Contractor and contract staff while undertaking their work in Banff National Park. Such wildlife attractants shall not be stored at the work site overnight. Lunches, coolers and food products, including waste food products, shall be securely stored away from access by animals. Daily removal of food scraps, food wrappers, pop cans or other attractive products to bear proof containers is mandatory. It is incumbent on the Contractor to notify Parks Canada and make specific arrangements to have garbage collected by Parks Canada when using existing Parks Canada Receptacles.
- .6 The Contractor and workers shall immediately report any circumstances related to food/garbage (e.g. overflowing container or strong smell) and wildlife to the ESO or the Departmental Representative. If neither can be reached, the Contractor/worker shall immediately contact Banff Dispatch at (403) 762 4506 and report the details.
- .7 Sanitary facilities, such as a portable container toilet, shall be provided by the Contractor and maintained in a clean condition.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

## **3 EXECUTION**

### **3.01 CLEARING AND GRUBBING**

- .1 The Contractor shall ensure that the substrate of riparian area of streams,

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rivers or watercourses, whether open water or frozen over shall not be disturbed by tracked, wheeled, or self-propelled equipment. The ESO or Departmental Representative will provide direction in the case of work occurring near any wetland area or watercourses.

- .2 The Contractor shall take all measures to ensure trees do not fall into streams, rivers, wetlands or water bodies or outside the clearing limits as marked by coloured flagging. Generally, work within a 30 meter buffer of watercourses, water bodies or wetlands requires the close oversight of the ESO or the Departmental Representative.
- .3 Trees inadvertently felled into streams, rivers, watercourses or outside the clearing limits shall be removed by means so as to not damage the substrate or any standing trees left outside the clearing limits. Machinery shall not go outside the clearing limits, or into streams, rivers, watercourses or water bodies to remove felled trees.
- .4 Logs and other salvage materials are to be conveyed to and placed in the storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, waterways, or water bodies.
- .5 During the grubbing component, stumps, roots, embedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to the waste pit area for chipping by others.
- .6 Existing areas or vegetation disturbed as a result of this contract shall be rehabilitated using approved topsoil from the park and a native grass seed mix as specified by the Departmental Representative or the ESO.

### **3.02 STRIPPING**

- .1 A contingency plan for control of dust generated from the construction site shall be prepared, with materials availability arranged in the event of their need. In the event of a work program shutdown during inclement weather, erosion control of bared soils or excavated materials stockpiles will be required. The Contractor's EPP will describe measures to be implemented in such circumstance.
- .2 Stripping close to any watercourse, water body or wetland shall employ methods to ensure materials are not pushed, fall or are eroded into the water or wetlands. Generally, work within a 30 meter buffer of waterways or wetlands require the close oversight of the ESO and the Departmental Representative.
- .3 No stripping shall occur outside of the designated area or within 1 meter of the drip line of existing forest.
- .4 Stripped soil materials shall be placed and stored at locations and in amounts and form as instructed by the Departmental Representative, for later reclamation use on graded slopes. Stripping piles may require erosion control, sedimentation protection or stabilization, depending on the location and anticipated duration of storage. At the Departmental Representatives direction, the Contractor shall prepare a plan for

management of each stripping pile.

### **3.03 MATERIAL LOADING, HAULING AND PLACEMENT**

- .1 During grade construction conducted close to any watercourse, water body or wetland methods shall be employed to ensure materials are not pushed, fall or are eroded into the water or wetlands.
- .2 No grade building shall occur outside of designated area or within 0.6 meters of the drip line of existing forest. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation at that location.
- .3 Materials shall be placed at storage sites or on grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation at that location.

### **3.04 EXCAVATION AND PLACEMENT**

- .1 Excavation will be undertaken to the construction drawings.
- .2 All sediment control measures shall be implemented by the Contractor prior to the commencement of work in the vicinity of any water bodies, watercourses or wetlands.
- .3 Special precautions may be required during excavation in the vicinity of intermittent or active drainage channels. See "Specific Concerns".
- .4 Placement of rip rap shall be undertaken without contacting the watercourse or wetted margins of the stream, unless approved by the Departmental Representative.
- .5 Fisheries protection windows may impact the timing of the work so that stream disturbance is prevented. See "Specific Concerns".
- .6 If a pump-out sump to dewater excavations will be required, the Contractor is to prepare an EPP which details how the dewatering shall be undertaken, to the satisfaction of the Departmental Representative and the ESO. Water containing suspended materials shall not be pumped into watercourses, drainage system or on to land, except with the permission of the Departmental Representative and ESO.

### **3.05 CONCRETE MANAGEMENT**

- .1 Where concrete work is to take place, the EPP must include the following concrete management elements:
  - .1 Concrete mixer truck washout must be contained in an approved facility with wash products taken back to the concrete batching yard for disposal.
  - .2 Rolling concrete mixers with surplus concrete in amounts less than one cubic meter of wet concrete may waste this concrete in the grade right-of way as directed by the Departmental Representative and well away from and in areas that drain well away from watercourses. Surplus

amounts in excess of one cubic meter are to be returned to the batching yard.

- .3 Water contaminated on the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.

### **3.06 FINE GRADING, TOPSOIL PLACEMENT, AND SEEDING**

- .1 Any exposed slopes that have been cut, filled, or fine graded or disturbed in any way will require cover by stripped soil and chip compost materials and seeded. Environmental concerns related to these activities largely focus on erosion prevention and sediment control. The Contractor is to present a plan for placement, spreading and stabilization of reclamation materials that controls erosion and prevents sedimentation, to the satisfaction of the Departmental Representative and ESO.

### **3.07 ACCESS AND OPERATIONS AROUND WILDLIFE UNDERPASS AND OVERPASS SITES**

- .1 The approaches to and from wildlife crossings are important for the future successful function of these structures. Ensure that minimal tree removal and vegetation disturbance occur at these locations during construction activities. The Contractor is to explain the method of establishing work access to the construction sites adjacent these structures, methods of operation to avoid incremental damage arising from access trails, and methods of restoration of access trails to pre-construction conditions, to the satisfaction of the Departmental Representative and the ESO.
- .2 The landscapes and forest cover at both ends of the wildlife crossing structures are important to the proper functioning of these structures for wildlife passage. The Contractor is alerted that disturbance or damage to terrain or vegetation outside of the defined construction footprint around these locations is forbidden.

### **3.08 SPECIFIC CONCERNS RELATIVE TO EROSION CONTROL AND SEDIMENTATION**

- .1 The Contractor shall prepare an Erosion and Sedimentation Management Plan for the components of the contract that are undertaken in proximity to watercourses, wetlands, or riparian environments. This plan shall be to the satisfaction of the Departmental Representative and ESO. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events.
- .2 An important desired end result is to allow no release into watercourses of sediments in levels that are deleterious to fish or that would harmfully alter, disrupt, or destroy fish habitat. Similarly, there is to be no sediment release into areas of vegetation growth or sensitive areas of sediments in levels that would adversely alter growing or hydraulic conditions. The target is 0 mg/L of TSS over background levels. The threshold is a maximum instantaneous increase of 25 mg/L over background levels when background levels are < 250 mg/L. or a maximum instantaneous increase of 10% over background levels when background levels are > 250 mg/L. This



threshold shall not be exceeded.

### **3.09 SPECIFIC CONCERNS RELATED TO FISH AND FISH HABITAT CULVERTS**

- .1 The floodway which is adjacent the areas being reconstructed is currently being assessed to see if fish habitat regulations apply to this project. The Departmental Representative will advise the Contractor if it is deemed to fit within the regulations governing working adjacent fish habitat.

**END OF SECTION**

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 All Divisions 01,02,03 and 30 Sections

### **1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

### **1.03 TESTING BY THE CONTRACTOR**

- .1 Testing required providing quality control to assure that the Work strictly complies with the Contract requirements shall include, but no be limited to:
  - .1 Testing all structural concrete, grout, reinforcing steel, asphalt concrete pavement, structural backfill, precast concrete box culverts, structural corrugated steel culverts/arches, misc. metals, concrete barriers, retaining walls, and all source acceptance testing; and
  - .2 All testing specified in the Contract Documents; and
  - .3 Any other testing required as a condition for deviation from the specified Contract procedures.
- .2 Testing proposed shall be based on testing requirements in the August 2007 Transportation Standard Specifications for Highway Construction Manual and subsequent updates.
- .3 The Contractor shall be fully responsible and bear all costs for all quality control testing and shall conduct such testing in the following manner:
  - .1 Provide testing facilities and personnel for the tests and inform Departmental Representative in advance to enable the Departmental Representative to witness test if so desired;
  - .2 Notify the Departmental Representative when sampling will be conducted:
  - .3 Within one day after completion of testing submit test results to the Departmental Representative; and
  - .4 Identify test reports with the name and address of the organization performing all the tests, and the date of the tests.
- .4 Approval of tested samples will be for characteristics or use named in such approval and shall not change or modify any Contact requirements.
- .5 Testing agencies, their inspectors, and their representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the Contract Documents, nor to approve or accept any part of the Work.
- .6 The minimum frequency for Quality Control during the embankment construction will be as follows:
  - .1 Embankment Construction with fine grained or granular soil - Standard

Proctor by ASTM D698 - 1 per change in material or 1 per week, whichever is more frequent.

- .2 Embankment construction with fine grained or granular soil - Field density by: ASTM D1556 - Sand Cone, ASTM D1267 - Balloon, or ASTM D2922 - Nuclear. To be done 1 per 1000 m2 per lift, spaced randomly across full width of embankment.
- .3 Embankment construction with blasted rock or oversize granular - Field observation with daily field report, done full time during blasted rock placement
- .4 Culvert Installation - Field Density -

.1 The Contractor shall prepare

a Quality  
QUALITY CONTROL  
PROGRAM

Control Program. The purpose of the program shall be to ensure the performance of the Work in accordance with the Contract requirements.

- .2 The Quality Control Program shall be described in a Quality Control Manual. The Contractor shall submit the Manual to the Departmental Representative for review in accordance to Section 01 33 00 - Submittal Procedures. The Manual shall develop a logical system for tracking and documenting the Quality Control of the Work. A systematic format and a set of procedures patterned on a recognized Quality Control Standard will be acceptable, subject to review by the Departmental Representative.
- .3 The Quality Control Manual shall include the following information:
  - .1 Distribution list, providing a list of names to whom the Manual shall be distributed
  - .2 Title page including Contract no, revision page with dates of revisions, and a Table of Contents
  - .3 Details of measuring and testing equipment and methods, including calibration
  - .4 Details of special processes as identified by the Departmental representative, including qualifications of personnel and certification.
  - .5 Procedures for shipping, packaging, and storage of materials and equipment.
  - .6 Procedures for maintaining quality

of any non-conformance, including identification and recording of deficiencies, tagging procedures for "HOLD" or "REJECT" items, and final disposition of non-conformance forms by Quality Control Manager.

- .8 Inspection and test checklists, including tabulated checklists describing all manufacturing and delivery activities such as Inspection or Test, frequency of tests, description of tests, acceptance criteria of tests, such as verification, witnessing or holding tests and sign-off by the Quality Control Manager and the Departmental Representative, if the Departmental Representative

witnesses the tests.

- .9 Forms used to ensure application of the inspection and test checklist requirements. These forms shall be identified in the checklists and describe all testing requirements for Specification compliance.
- .4 The Contractor shall appoint a Quality Control Manager who shall report regularly to the Contractor's management at a level which shall ensure the Quality Control requirements are not subordinated to manufacturing, construction or delivery. The Quality Control Manager shall be empowered by the Contractor to resolve quality matters.
- .5 The Quality Control Manual shall include samples of all forms to be filled in by the Quality Control Inspectors. All forms shall be signed by the Quality Control Manager and submitted promptly to the Departmental Representative who will add its review signature.
- .6 An independent check of all Work shall be performed by the Contractor. The Contractor shall appoint Quality Control Inspectors to ensure compliance of products and workmanship with Contract requirements. The same personnel may not be used to perform a given task and to check the quality and accuracy of the task.
- .7 At completion of the Work a bound and itemized copy of all Quality Control documents and reports shall be prepared by the Contractor's Quality Manager and submitted to the Departmental Representative.

#### **1.05 INSPECTION**

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative 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.

#### **1.06 INDEPENDENT INSPECTION AGENCIES**

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

- 
- .3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative.

#### **1.07 ACCESS TO WORK**

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

#### **1.08 PROCEDURES**

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

#### **1.09 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 may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

#### **1.10 REPORTS**

- .1 Submit 4 copies of inspection and test reports to Departmental Representative.

#### **1.11 TESTS AND MIX DESIGNS**

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

#### **1.12 MILL TESTS**

- .1 Submit mill test certificates as requested.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

**1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours.

**1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

**1.03 INSTALLATION AND REMOVAL**

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

**1.04 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.

**1.05 CONSTRUCTION PARKING**

- .1 Provide and maintain adequate access and parking at the project site in areas approved by the Departmental Representative.
- .2 Build and maintain temporary roads and provide snow removal during period of Work..
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor's use of roads.

**1.06 SECURITY**

- .1 If required by the Contractor, provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays. The Contractor is advised that some random acts of vandalism to equipment have occurred within the Park.

**1.07 OFFICES**

- .1 Provide office of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available

location.

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

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

### **1.09 SANITARY FACILITIES**

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

### **1.10 CONSTRUCTION SIGNAGE**

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

### **1.11 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.



—  
3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

---

**1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours.
- .2 Section 01 52 00 - Construction Facilities

**1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

**1.03 INSTALLATION AND REMOVAL**

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

**1.04 HOARDING**

- .1 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.05 GUARD RAILS AND BARRICADES**

- .1 Provide secure, rigid guard rails and barricades around deep excavations.

**1.06 ACCESS TO SITE**

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

**1.07 PUBLIC TRAFFIC FLOW**

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

**1.08 FIRE ROUTES**

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

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

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

.2 Be responsible for damage incurred.

## 2 PRODUCTS

### 2.01 NOT USED

.1 Not Used.

## 3 EXECUTION

### 3.01 NOT USED

.1 Not Used.

END OF SECTION

## 1 GENERAL

### 1.01 RELATED REQUIREMENTS

- .1 Section 01 45 00 - Quality Control.

### 1.02 REFERENCES

- .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 products or systems are 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 born 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.

### 1.03 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.

### 1.04 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.

#### **1.05 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 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber and miscellaneous metals on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

#### **1.06 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.

#### **1.07 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.

#### **1.08 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.

#### **1.09 CO-ORDINATION**

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

#### **1.10 CONCEALMENT**

- .1 The Departmental Representative will inspect all work prior to any concrete pours. The Contractor shall notify the Departmental Representative 24 hours before any pour for inspection .

#### **1.11 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.

#### **1.12 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.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

### 1.13 PROTECTION OF WORK IN PROGRESS

- .1 Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

### 1.14 EXISTING UTILITIES

- .1 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

## 2 PRODUCTS

### 2.01 NOT USED

- .1 Not Used.

## 3 EXECUTION

### 3.01 NOT USED

- .1 Not Used.

END OF SECTION

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 32 18 - Construction Progress Schedules - Bar (GANTT) Chart

### **1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the contract and will not be measured for payment.

### **1.03 REFERENCES**

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

### **1.04 QUALIFICATIONS OF SURVEYOR**

- .1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative.

### **1.05 SURVEY REFERENCE POINTS**

- .1 Existing base horizontal and vertical control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Departmental Representative.
- .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

### **1.06 SURVEY REQUIREMENTS**

- .1 Contractor will be responsible for all staking and layout.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, cut and fill.
- .4 Stake slopes and top of embankment as required during construction.



**1.07 EXISTING SERVICES**

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

**1.08 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.

**1.09 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying those elevations and locations of completed Work that conform with Contract Documents.

**2 PRODUCTS**

**2.01 NOT USED**

- .1 Not Used.

**3 EXECUTION**

**3.01 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours.
- .2 Section 01 35 43 - Environmental Procedures.
- .3 Section 01 77 00 - Closeout Procedures.

### **1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

### **1.03 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site bear proof containers for collection of waste materials and debris.
- .5 Dispose of waste materials and debris off site.
- .6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

### **1.04 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.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Inspect finishes , and ensure specified workmanship and operation.
- .8 Sweep and wash clean paved areas.
- .9 Remove dirt and other disfiguration from exterior surfaces
- .10 Clean drainage systems

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

## **3 EXECUTION**

### **3.01 NOT USED**

- .1 Not Used.

**END OF SECTION**

**1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 74 11 - Cleaning.
- .2 Section 01 78 00 - Closeout Submittals.

**1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

**1.03 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 Design-Builder to correct Work as directed.
  - .3 Final Inspection:
    - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
    - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

**1.04 FINAL CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

**2 PRODUCTS**

**2.01 NOT USED**

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

**1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 71 00 - Examination and Preparation
- .4 Section 01 77 00 - Closeout Procedures

**1.02 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

**1.03 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 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
  - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

**1.04 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual.
- .2 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .3 Contract Drawings and shop drawings: mark each item to record actual

construction, including:

- .1 Field changes of dimension and detail.
  - .2 Changes made by change orders.
  - .3 Details not on original Contract Drawings.
  - .4 References to related shop drawings and modifications.
- .4 Specifications: mark each item to record actual construction, including:
- .1 Changes made by Addenda and change orders.
- .5 Other Documents: maintain inspection certifications and field test records required by individual specifications sections.

### **1.05 FINAL SURVEY**

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

### **1.06 WARRANTIES AND BONDS**

- .1 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .2 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers.
  - .4 Verify that documents are in proper form, contain full information, and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .3 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION



**1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 43 - Environmental Procedures

**1.02 REFERENCES**

- .1 Definitions:
  - .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
  - .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
  - .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .2 Reference Standards:
  - .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
    - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations SOR/2005-149.
  - .2 Department of Justice Canada (Jus)
    - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) 1992, (c. 34).
    - .2 Transportation of Dangerous Goods Regulations T-19.01-SOR/2001-286.
  - .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .4 National Research Council Canada Institute for Research in Construction (NRC-IRC)
    - .1 National Fire Code of Canada-2010.

**1.03 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.

**1.04 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 Submittal Procedures.
- .2 Product Data:
  - .1 Submit current copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.

- .2 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .4 Storage and Handling Requirements:
  - .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
  - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
  - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.
  - .4 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
  - .5 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
    - .1 When hazardous waste is generated on site:
      - .1 Co-ordinate transportation and disposal with Departmental Representative.
      - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
      - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
      - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
      - .5 Label container(s) with legible, visible safety marks as prescribed by federal and provincial regulations.
      - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
      - .7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.
      - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.
      - .9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable

measures to control release.

- .2 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .3 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Description:
  - .1 Bring on site only quantities hazardous material required to perform Work.
  - .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

## **3 EXECUTION**

### **3.01 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management:
  - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
  - .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
  - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
  - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
  - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
  - .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
  - .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
  - .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
    - .1 Hazardous wastes recycled in manner constituting disposal.
    - .2 Hazardous waste burned for energy recovery.
    - .3 Lead-acid battery recycling.
    - .4 Hazardous wastes with economically recoverable precious metals.

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BANFF LEGACY TRAIL FLOOD HAZARDOUS MATERIALS  
REPAIRS  
BANFF NATIONAL PARK  
PROJ NO: BNP13-04-050

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END OF SECTION

END OF SECTION

## 1 GENERAL

### 1.1 RELATED

### REQUIREMENTS

- .1 Section 01 35 43 - Environmental Procedures.

### 1.02 MEASUREMENT PROCEDURES

- .1 This work will not be measured for payment. Include the costs in Unit Price items for which concrete is required.
- .2 Heat of water and aggregates and providing cold weather protection will not be measured but considered incidental to work. Include costs in Unit Price items for which concrete is required.
- .3 Cooling of concrete and providing hot weather protection will not be measured but considered incidental to work. Include costs in Unit Price items for which concrete is required.
- .4 Supply and installation of anchor bolts, nuts and washers, bolt grouting, will not be measured but considered incidental to work. Include costs in Unit Price items for which concrete is required.
- .5 Supply and installation of perforated drains behind abutments or footing will not be measured but considered incidental to work. Include costs in Unit Price items for which concrete is required.
- .6 Supply and installation of soil reinforcement behind abutments or footing will not be measured but considered incidental to work. Include costs in Unit Price items for which concrete is required.

### 1.03 REFERENCES

- .1 ASTM International
  - .1 ASTM C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars using 50-mm Cube Specimens
  - .2 ASTM A 185/A 185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .3 ASTM D 260-86(2001), Standard Specification for Boiled Linseed Oil.
  - .4 ASTM D 1751-04, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
- .3 CSA International
  - .1 CSA-A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001,

- A3002, A3003, A3004 and A3005).
- .3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.

#### 1.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and necessary details of reinforcing.
  - .2 Submit drawings showing formwork and falsework design to: CSA A23.1/A23.2.
  - .3 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta
- .3 Minimum 4 weeks prior to the starting of concrete work, submit testing, inspection results and reports done by a qualified independent inspection and testing laboratory, for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found. The materials of the mix design that are to be certified to meet the mix requirements are:
  - .1 Portland Cement
  - .2 Supplementary cementing materials
  - .3 Admixtures
  - .4 Aggregates
  - .5 Water
- . 4 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.**
- .5 Provide certification that plant , equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.
- .6 Provide certification that alkali-aggregate reactivity and iron content of the materials has been examine and meets the requirements
- .7 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

#### 1.05 QUALITY ASSURANCE

- .1 Submit to Departmental Representative, 4 weeks minimum prior to starting concrete work, proposed quality control procedures in accordance with Section 01 45 00 - Quality Control for approval. The plan is to address quality control for the following:
  - .1 Falsework erection
  - .2 Hot weather concrete
  - .3 Cold weather concrete
  - .4 Curing
  - .5 Finishes

.6 Formwork removal

#### 1.06 DELIVERY, STORAGE AND HANDLING

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

#### 1.07 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Use trigger operated spray nozzles for water hoses.
- .3 Designate a cleaning area for tools to limit water use and runoff.
- .4 Carefully coordinate the specified concrete work with weather conditions.
- .5 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .6 Prevent plasticizers, water reducing agents, and air-entraining agents from entering drinking water supplies of streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial, and federal regulations.

#### PART 2 - PRODUCTS

##### 2.1 DESIGN CRITERIA

- .1 To CSA A23.1/A23.2, Alternative 1
- ##### 2.2 PERFORMANCE

#### **CRITERIA**

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

##### 2.3 MATERIALS

- .1 Cement: Normal Portland Cement, Type 10, to CAN/CSA-A5
- .2 Supplementary cementing materials: with minimum 25% fly ash replacement to CSA A23.5.
- .3 Water: to CSA A23.1.

- .4 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.
- .5 Welded steel wire fabric: to ASTM A 185.
- .6 Other concrete materials: to CSA A23.1/A23.2.

**2.4 MIXES**

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative] performance criteria to CSA A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
  - .2 Provide concrete mix to meet following requirements:

Use	28 Day Max Compressive	Normal	Entrained	Supplementary Aggregate Air Content
Materials	Strength (MPa) * see below		(mm)	(%)

----- Abutments, footings and struts	35	28	6 +/- 2	Max 25 % Fly Ash
----- Bridge Barriers and Approach Slabs	35	20	6 +/- 2	Max 7.5% Silica Fume
----- Deck Slab	35	20	6 +/- 2	Max 7.5 % Silica Fume
-----	-----	-----	-----	-----

Use	*Before adding super Slump Range (mm)	Ratio
----- Abutments, footings and struts	50-70	0.40
----- Bridge Barriers and Approach Slabs	60-80*	0.38
----- Deck Slab	60-80*	0.38
-----	-----	-----

Before adding super plasticizer. Slump to not exceed 150 mm with super plasticizer.

**3 EXECUTION**

**3.01 PREPARATION**

- .1 Obtain Departmental Representative's approval before placing concrete. Provide 48 hours notice prior to placing concrete
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.



- .4 Maintain accurate records of poured concrete to indicate date, location or pour, quality, air temperature and test samples taken.
- .5 Do not place load upon new concrete until authorized by Departmental Representative.

### **3.02 INSTALLATION/ APPLICATION**

- .1 Do cast-in-place concrete work in accordance to CAN/CSA-A23.1
- .2 Sleeves and inserts:
  - .1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.
  - .2 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative.

### **3.3 FINISHES**

- .1 Formed surfaces exposed to view: in accordance with CSA A23.1/A23.2 and as per the Drawings.
- .2 Deck to receive a Floated finish.
- .3 Exposed faces of abutments, and barrier except top, to receive a Rubbed finish.
- .4 Approach slabs and tops of barriers to receive a broomed finish
- .5 All other surfaces to receive an Ordinary Finish.
- .6 Use procedures acceptable to Departmental Representative to remove excess bleed water. Ensure surface is not damaged.
- .7 Use curing compounds compatible with applied finish on concrete surfaces.

### **3.04 CURING**

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

### **3.05 SEALING APPLICATION**

- .1 An approve sealer shall be applied to all exposed concrete surfaces to 600 mm below grade except underside of deck between girders.
- .2 Acceptable commercially available products are as follows:
  - .1 Dry-Trete 1000L by DRE Industries (application rate 193 ml/m2)
  - .2 Dynasytan BH-0 by Degussa Corporation (application rate 156 ml/m2)
  - .3 Hydrozo 100 by ChemRex Inc/Hydrozo (application rate 272 ml/m2)
  - .4 Or Equal
- .3 Install as per manufacturer's recommendations.

### 3.06 PROTECTION

- .1 Unformed surfaces: cure with burlap, water and polythene. Carefully place two layers of damp burlap on surface of concrete. Overlap each strip by minimum 75 mm and secure against displacement by wind. Maintain burlap in place and keep thoroughly wet for seven days after placement. Place polythene sheeting on wetted burlap to maintain moisture.
- .2 Formed surfaces: no additional curing will be required if formwork is left in place for seven days or more. If formwork removed in less than seven days, cure in manner specified for unformed surfaces for remainder of seven day period.
- .3 During curing period, only uncover areas needed for finish treatment. Re-cover and continue curing.

### 3.07 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials shall be carried out by a Testing Laboratory in accordance with CAN/CSA-A23.1 and Section 01 45 00 - Quality Control.
- .2 Contractor shall pay costs of QC testing.
- .3 Contractor shall take additional sets of cylinders during cold weather concreting. Cure cylinders on job site under same condition as concrete which they represent.
- .4 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.
- .5 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

### 3.08 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Use trigger operated spray nozzles for water hoses.
- .3 Designate cleaning area for tools to limit water use and runoff.
- .4 Cleaning of concrete equipment to be done in accordance with Section 01 35 43 Environmental Procedures.
  - .1 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative .
  - .2 Provide appropriate area on job site where concrete trucks and be safely washed.
  - .3 Divert admixtures and additive materials from landfill to approved official hazardous material collections site after receipt of written approval from Departmental Representative .
  - .4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where

it will pose health or environmental hazard.  
END OF SECTION

**END OF SECTION**

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**Part 1            General****1.1                MISCELLANEOUS METALS INCLUDE**

- .1        Barrier Anchor Rods
- .2        Anchors, anchor bolts and spacers.
- .3        Self Closing Steel Gates and Double Gates as required for the job.
- .4        Metal and non-metal components of utility accommodation.
- .5        Other metal components necessary for construction that remain in the final product.

**1.2                RELATED SECTIONS**

- .1        Section 01 33 00 - Submittal Procedures.
- .2        Section 01 35 43 - Environmental Procedures.

**1.3                REFERENCES**

- .1        CAN/CSA G40.21-04, Structural Quality Steel.
- .2        AWS/AASHTO D1.5, Bridge Welding Code.
- .3        C579-01(2006), Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- .4        C827-01a(2005), Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
- .5        C307-03, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
- .6        C181-03, Standard Test Method for Workability Index of Fireclay and High-Alumina Plastic Refractories.
- .7        C580-02, Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- .8        C882-05, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete by Slant Shear.
- .9        C531-00(2005), Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- .10      CAN/CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.
- .11      CAN/CSA W59-03, Welded Steel Construction.

**1.4                MEASUREMENT PROCEDURES**

- .1        This work will not be measured for payment. Include costs in Unit Price Items for which Miscellaneous Metal is required.

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**1.5 DESCRIPTION**

- .1 Adherence to Drawings** - Steelwork items shall be fabricated in accordance with the Drawings.
- .2 Working Drawings** - the working Drawings shall show all information necessary for the fabrication of the steelwork.
  - .1 Working Drawings shall be in the same system of units as the design Drawings.
  - .2 Working Drawings shall be on sheets approximately 600 mm by 850 mm (one Drawing per sheet). Lettering for notes and dimensions shall be at least 2.5 mm, and 4 mm for headings. Drawings shall be legible when half-sized or microfilmed.
  - .3 In the case of simple items, where the design Drawings are complete enough to be used for fabrication, the Contractor may, with approval of the Departmental Representative, dispense with working Drawings. The Contractor shall notify the Departmental Representative of such intention in writing.
  - .4 The Contractor shall submit to the Departmental Representative four sets of all working Drawings, for the Departmental Representative's information only, two weeks prior to the fabrication of the steelwork.
- .3 Inspection** - The Contractor shall notify the Departmental Representative at least 14 days before fabrication. The Contractor shall allow the Departmental Representative's representatives access to all parts of the work, and shall supply such information and assistance as is required. When the Departmental Representative requests, the Contractor shall provide samples of any materials. Inspection by the Departmental Representative will not relieve the Contractor from obligation to perform the work in accordance with the contract.
  - .1 Any work found to be unacceptable shall be corrected in accordance with CSA W59-03, Section 5.10.
- .4 Rejections** - The Departmental Representative may reject any items that do not meet the requirements of the contract.

**1.6 TEST REPORTS**

- .1** Prior to fabrication, and, if requested, provide Departmental Representative with two copies of steel producer's certificates in accordance with CAN/CSA G40.21-04.

**1.7 SUBMISSIONS**

- .1 Welding Procedures** – Welding procedures bearing the approval of the Canadian Welding Bureau shall be submitted for each type of weld to be used. The welding procedures shall be reviewed by the Departmental Representative before welding proceeds.
- .2 Shop Drawings** – Five copies of the shop drawings showing all details shall be prepared by the Contractor and submitted to the Departmental Representative for review and acceptance prior to fabrication. The shop drawings shall be legible and of adequate quality to be reproduced and microfilmed. Each drawing shall have a sufficient blank space for the Departmental Representative's acceptance stamp. The Departmental Representative's

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acceptance of the shop drawings shall not be construed as relieving the Contractor from his responsibility for errors or omissions. All shop drawings will be stamped as follows:

“This acceptance applies to general arrangements and details of design but not to dimensions or details of fabrication and is subject to the requirements of specifications and to such corrections as may be marked here on.”

Fabrication shall not commence prior to the review and acceptance of the shop drawings.

**1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 35 43, Environmental Procedures.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with the approved EPP.
- .3 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

**Part 2 Products**

- .1 Steel, except where shown otherwise on the Drawings or in the Specifications, shall conform to CAN/CSA G.40.21-M, Grade 300W or better.
- .2 Mill certificates shall be provided for all material before fabrication commences
- .3 All miscellaneous steel shall be galvanized in accordance with Subsection 3.14 - Galvanizing of this section of this document.
- .4 The quality and care of electrodes shall conform to the requirements of the latest CSA W59-03.
- .5 **Storage of Materials** - Structural material shall be stored above ground. It shall be kept free from dirt and other foreign matter, and shall be protected as far as practicable from corrosion. Long members shall be supported on skids placed near enough together to prevent injury from deflection.

**Part 3 Execution****3.1 WELDING**

- .1 All welding shall be done in accordance with procedures approved by the Canadian Welding Bureau (CWB) and reviewed by the Departmental Representative.
- .2 All welded fabrication shall be done to the requirements of the latest CSA W59-03.
- .3 Welding shall be undertaken by a company approved by the CWB to the requirements of CSA W47. 1, Division 2 or better.

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**3.2 WELDERS AND WELDING OPERATORS**

- .1 The Contractor shall produce evidence that all welders and welding operators to be employed on the work are currently qualified by CWB in the processes in which they are to be employed.

**3.3 FILLER METALS**

- .1 Low hydrogen fillers, fluxes and welding practices shall be used throughout. The low hydrogen covering and flux shall be protected and stored as specified by AWS Standard D1.5. Flux cored welding or use of cored filled wires in the submerged arc process or shielding gas processes will not be permitted.

**3.4 BACKING BARS**

- .1 Backing bars shall be fitted all around the inside of the joint. The separation of faying surfaces between the backing bars and material to be welded shall not exceed 1 mm, 100% fusion must be obtained into the backing bar including the corners of HSS members.

**3.5 RUN-OFF TABS**

- .1 Run-off tabs shall be used at the ends of all welds that terminate at the edge of a member. They shall be tack welded only to the portion of the material that will not remain a part of the structure, or where the tack will be welded over and fused into the final joint. After welding, the tabs shall be removed by flame cutting, not by breaking off.

**3.6 METHOD OF WELDMENT REPAIR**

- .1 Repair procedures for unsatisfactory weldments shall be submitted for approval by the Departmental Representative prior to repair work commencing.

**3.7 GRINDING OF WELDS**

- .1 Fillet welds not conforming to acceptable profile shall be ground to the proper profile without substantial removal of the base metal. Grinding shall be smooth and parallel to the line of stress. Caution shall be exercised to prevent over grinding. Acceptability of welds without grinding will be determined by the Departmental Representative.

**3.8 RAIL FABRICATION**

- .1 Rail sections shall be orientated such that the tube seam is always located at the bottom. Tube weld seam shall be kept on the back side of the post.

**3.9 TOLERANCES**

- .1 Sleeve to Rail – Clearance between the rail sections and the sleeves shall be sufficient to ensure an easy fit after galvanizing. The maximum radial clearance allowed around the sleeve when fitted into the rail shall be 1 mm (2 mm total) after galvanizing with the tube seam removed.
- .2 Posts – Post assembly lengths shall be within 3 mm of the specified lengths
- .3 Rails – Individual rail sections shall be straight and true with no evidence of kinks or dents and with a maximum variation from straightness not exceeding 3 mm over a 3.0 m length.

Welded splices shall not be evident in the final product, and shall be straight, kink free and conform to the same section as the adjacent tubing. Bolted splices shall be straight with no offset due to loose fitting sleeves.

**3.10 IDENTIFICATION**

- .1 To assist field erection, shop drawing mark numbers shall be stamped on the rails and posts. Rail mark numbers shall be stamped on the underside of the rail near the ends. Post mark numbers shall be stamped on the underside of the base plates. The areas to be stamped shall be ground to remove mill scale. Stamps shall be a minimum of 12 mm high, and the resulting marks shall be at least 1.0 mm deep to be legible after galvanizing.

**3.11 BASE PLATE CORROSION PROTECTION**

- .1 The bottom face of each base plate shall be protected by a medium grey color barrier coating approved by the Departmental Representative, to prevent contact between the zinc and the concrete. The galvanized surface must be roughened prior to application of barrier coating. The surface preparation of the galvanized surface and the dry film thickness (DFT) of the coating shall be in accordance with the coating manufacturer's recommendations. The coating manufacturer's product data sheet shall be provided to the Departmental Representative prior to the application of the coating.

**3.12 FLAME CUTTING**

- .1 Steel may be flame cut, using a mechanical guide, provided a smooth surface is secured. Flame cutting by hand shall be done only where approved by the Departmental Representative, and the surface shall be made smooth by planing, chipping or grinding. The cutting flame shall be so adjusted and manipulated as to avoid cutting beyond the prescribed lines. Re-entrant cuts shall be filleted to a radius of not less than 10 mm. Edges of tension members shall be ground to a radius of 2 mm.

**3.13 BENT PLATES**

- .1 Plates to be bent shall be taken from the stock plates so that the bend line will be at right angles to the direction of rolling. The inside radius of the bend shall not be less than the thickness of the plates. Before bending, the comers of the plate shall be ground to a radius of 2 mm throughout the part to be bent.

**3.14 GALVANIZING**

- .1 All steelwork shall be galvanized after complete fabrication to the requirements of CAN/CSA-G164-M92 (R2003). The galvanizer shall safeguard against embrittlement as required in CAN/CSA-G164-M92 (R2003), Appendix A. Galvanized members shall be subject, at the discretion of the Departmental Representative, to the tests for embrittlement outlined in CAN/CSA-G164-M92 (R2003), Section 5.5.
- .2 The chemical composition of steel being galvanized shall be as follows:
  - .1 Carbon less than 0.25%
  - .2 Phosphorus less than 0.05%
  - .3 Manganese less than 1.35%
  - .4 Silicon less than 0.03% or between 0.15% and 0.25%



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- .3** For steel not meeting these chemical composition requirements, special galvanizing techniques shall be developed by the galvanizer to ensure that the specified coating thickness and adherence is achieved. A detailed description of the special techniques shall be submitted to the Departmental Representative for review two (2) weeks prior to galvanizing.

**3.15           INSTALLATION**

- .1** Miscellaneous Metals shall be installed as shown on the Drawings. Field welding will be permitted only as shown on the Drawings or as authorized by the Departmental Representative

**3.16           FIELD REPAIR OF GALVANIZING**

- .1** Repair of galvanizing shall only be done if bare areas are infrequent, small and suitable for repair as determined by the Departmental Representative.
- .2** Repair of galvanized surfaces shall be in accordance with ASTM 780, Method A3 Metallizing. The thickness of the metallizing shall be a minimum of 180 µm, and the repair tested for adhesion. Alternatively, the galvanizing may be repaired using two (2) coats of a one (1) component zinc-rich coating containing >95% non-toxic electrolytic zinc powder (pure to 99.995%) in a non-toxic solvent.

**3.17           ERECTION**

- .1** The line and grade of the railing shall be true to that shown on the Drawings, and not follow any unevenness in the superstructure. It will be necessary to adjust the height and plumbness of each post, in order to compensate for normal superstructure variations, and achieve the desired line and grade on the bridgerail.
- .2** Anchor bolts that project less than the thickness of the nuts by more than 2 threads, shall be extended. The proposed repair will require the approval of the Departmental Representative in writing and the repair shall be done at no cost to the Owner.

**3.18           EPOXY GROUT**

- .1** Non-shrink epoxy grout shall be 100% solids, premeasured, prepackaged system containing thermosetting epoxy resins, expansive additives and inert fillers. The manufacturer shall be ISO 9001 certified and have at least five years experience in the manufacture of precision epoxy-based machinery grouts.
- .2** The grout material shall meet all the following typical performance criteria when cured at 73°F (23°C):
- |           |                                    |   |
|-----------|------------------------------------|---|
| <b>.1</b> | Compressive Strength, ASTM C 579 B |   |
|           | Compressive Strength               |   |
|           | 8 Hours                            | 8000 psi (55.2 MPa)                       |
|           | 1 Day                              | 13000 psi (89.7 MPa)                      |
|           | 7 Days                             | 15000 psi (103.5 MPa)                     |
|           | Tested at 180°F (82°C)             | 11000 psi (75.9 MPa)                      |
|           | Compressive Modulus                |   |
|           | 8 Hours                            | 1.3 x 10 <sup>6</sup> psi (0.9 x 104 MPa) |
|           | 1 Day                              | 1.6 x 10 <sup>6</sup> psi (1.1 x 104 MPa) |

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- |    |  |  |
|----|--|--|
|    | 7 Days<br>Tested at 180°F (82°C)                               | 1.7 x 10 <sup>6</sup> psi (1.2 x 104 MPa)<br>1.2 x 10 <sup>6</sup> psi (0.8 x 104 MPa) |
| .2 | Height Change, ASTM C 827,<br>90°F (32°C)                      | Positive Expansion   |
| .3 | Effective Bearing Area 95%                                     |  |
| .4 | Tensile Strength, ASTM C 307                                   | 2400 psi (16.5 MPa)  |
| .5 | Creep, ASTM C 1811, 1 Year,<br>600 psi (4.1 MPa), 140°F (60°C) | 1.8 x 10 <sup>-3</sup> in/in/°F (mm/mm/°C)   |
| .6 | Flexural Strength, ASTM C 580<br>7 Days                        | 5000 psi (34.5 MPa)  |
| .7 | Bond to Concrete,<br>ASTM C 882 Concrete Failure               |  |
| .8 | Coefficient of Thermal Expansion,<br>ASTM C 531                | 17 x10 <sup>-6</sup> in/in/°F<br>(30 x 10 <sup>-6</sup> mm/mm/°C)                      |
| .3 | Aggregate reduction in the field shall not be allowed.         |  |

**3.19 CLEAN UP**

- .1 At the completion of the contract, steelwork shall be cleaned of all foreign materials.

**END OF SECTION**

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Banff Legacy Section  
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## **1 GENERAL**

### **1.01 RELATED WORK**

- .1 This section specifies requirements for supplying and installing all labour and materials to fully construct/repair the wood post portions of the gates as indicated on the drawings or as directed by the Departmental Representative.

### **1.02 REFERENCES**

- .1 CSA International
  - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  - .2 CSA O141-05(R2009), Softwood Lumber. Sheathing.
- .2 National Lumber Grades Authority (NLGA)
  - .1 Standard Grading Rules for Canadian Lumber 2010.

### **1.03 MEASUREMENT AND PAYMENT**

- .1 Supply, deliver and complete installation of one new gate and the supply, deliver, and repair of the existing east gate.
- .2 Payment shall be paid under the "Unit Price Item: Pedestrian Gates Repair/Install."

### **1.04 QUALITY ASSURANCE**

- .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
  - .1 Standard Grading Rules for Canadian Lumber (NLGA) Version 2010.

### **1.05 DELIVERY, STORAGE AND HANDLING**

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

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19%

or less in accordance with following standards:

- .1 CAN/CSA-0141.
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
  - .3 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Machine stress-rated lumber is acceptable for all purposes.
  - .3 All dimension lumber to be used in exterior conditions shall be incised to provide for a complete penetration of ACQ wood preservative.
  - .4 Wood Preservative:
    - .1 (A.C.Q) Pressure treatment to a net retention of 6.4 kg per cubic meter of wood. Conforming to CSA 0132.1-M1977 sections. This A.C.Q. wood treatment shall be applied to all new wood construction materials.

## **2.02 ACCESSORIES**

- .1 Fasteners: Bolts, nuts, washers, and dowels to CAN/CSA-G164, for exterior work .
- .2 Nails, spikes and staples to N.B.C 9.23.2 except:
  - .1 Use self drilling screws c/w a special zinc coating for all exterior uses when fastening rails to wooden posts. Contractor to supply sample of screw type to Departmental Representative prior to installation of work.
- .3 All bolts that have been cut or the galvanizing damaged shall be touched up with zinc rich paint.

## **3 EXECUTION**

### **3.01 PREPARATION**

- .1 Treat surfaces of material with wood preservative, before installation.
- .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and 1 minute soak on plywood.
- .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

### **3.02 INSTALLATION**

- .1 Comply with requirements of NBC Section 9.23, supplemented by the following paragraphs.
- .2 Install member true to line, levels, and elevations as supplied by Departmental Representative and on plans.
- .3 Construct continuous members from pieces of longest practical length.

- .4 Make adequate provision for possible erection stresses.
- .5 Frill bolt holes 1.5 mm larger than bolt diameter.
- .6 Re-treat surfaces exposed by cutting or boring with liberal brush application of a clear preservative after installation. Ensure a neat and clean end product results after retreating is done. Non-matching color is not acceptable and will be rejected by Departmental Representative on-site.

### 3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

**END OF SECTION**

## **1 GENERAL**

### **1.01 SUMMARY**

- .1 This section defines correction of dry density to take into account aggregate particles larger than 19 mm.

### **1.02 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C 127-04, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
  - .2 ASTM D 698-00a e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>2</sup> (600 kN-m/m<sup>2</sup>)).
  - .3 ASTM D 1557-02 e1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>2</sup> (2,700 kN-m/m<sup>2</sup>)).
  - .4 ASTM D 4253-00, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

### **1.03 DEFINITIONS**

- .1 Corrected maximum dry density is defined as:
  - .1  $D = (D1 \times D2) / ((F1 \times D2) + (F2 \times D1))$
  - .2  $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
  - .3 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 A of ASTM D 1557.
    - .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 C 127.
  - .4 For free draining aggregates, determine D1 (maximum dry density) to ASTM D 4253 wet method when directed by Departmental Representative.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.



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BANFF LEGACY TRAIL FLOOD  
REPAIRS  
BANFF NATIONAL PARK  
PROJ NO: BNP13-04-050

CORRECTED MAXIMUM DRY  
DENSITY FOR FILL

SECTION 31 05 10  
PAGE 2

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3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

END OF SECTION

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## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 51 - Special Procedures for Traffic Control and Construction Detours.
- .2 Section 01 35 43 - Environmental Procedures

### **1.02 MEASUREMENT PROCEDURES**

- .1 Quantities for payment in hectares measured within defined limits , for clearing and grubbing areas according to these specifications, shall include all labour, equipment and materials to satisfactorily complete this item of work. Payment shall be under Unit Price Item - Clearing and Grubbing.
- .2 No overhaul will be paid for grubbing

### **1.03 DEFINITIONS**

- .1 Clearing consists of cutting off trees and brush vegetative growth to within 300 mm of the ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Flush cutting consists of cutting trees, stumps or vegetative growth to within 100 mm of the ground, leaving the root structure undisturbed and disposing of felled trees, previously uprooted trees, and stumps and clearing debris as specified.
- .3 Grubbing consists of excavation and disposal of stumps and roots to not less than specified depth below existing ground surface.
- .4 Chipping consists of shipping wood debris, except merchantable timber, to wood chips. Finished wood chip material shall be able to pass through a 100 mm by 100 mm screen.
- .5 Merchantable timber is all timber with a butt diameter in excess of 150 mm and top down to 100 mm,

### **1.04 QUALITY ASSURANCE**

- .1 All Quality Control testing by the Contractor.

### **1.05 STORAGE AND PROTECTION**

- .1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing pavement, utility lines, water courses, and root systems of trees 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.

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## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Not used.

## **3 EXECUTION**

### **3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

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

### **3.02 PREPARATION**

- .1 Inspect site and verify with Departmental Representative items designated to remain.
- .2 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.
  - .2 When utility lines which are to be removed are encountered within area of operations, notify Departmental Representative in ample time to minimize interruption of service.
- .3 Notify utility authorities before starting clearing and grubbing.
- .4 Keep roads and walks free of dirt and debris.

### **3.03 CLEARING**

- .1 Clear as directed by Departmental Representative, by cutting trees and vegetative growth.
- .2 Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative .
- .3 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.
- .4 All clearing shall be felled in such a manner that surrounding vegetation is preserved along construction limits. Stumps remaining within 3.0 metres of cleared perimeter are to be cut flush with ground and vegetative mat

left undisturbed.

### **3.04 GRUBBING**

- .1 Remove and dispose of roots and designated stumps from indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 200 mm below ground surface.
- .3 Grubbing ripper teeth depth shall be kept as shallow as possible to minimize contamination of topsoil with subsoil. This may require individual ripping of stumps in some locations. In addition, while removing stumps, roots or embedded logs, the Contractor shall shake them on site to remove as much soil as possible.

### **3.05 REMOVAL AND DISPOSAL**

- .1 Remove cleared and grubbed materials to disposal area designated by Departmental Representative .
- .2 Chip cleared and grubbed vegetative material on site as directed by Departmental Representative.

### **3.06 FINISHED SURFACE**

- .1 Leave ground surface in condition suitable for stripping of topsoil to approval of Departmental Representative.
- .2 In areas of flush cutting, leave stumps cut flush with ground elevation and root structure undisturbed.

### **3.07 CLEANING**

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

END OF SECTION

**END OF SECTION**

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## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours.
- .2 Section 01 35 43 - Environmental Procedures.
- .3 Section 01 56 00 - Temporary Barriers and Enclosures
- .4 Section 31 11 11 - Clearing and Grubbing
- .5 Section 32 11 19 - Granular Sub-base
- .6 Section 33 42 13 - Pipe Culverts

### **1.02 DESCRIPTION**

- .1 This item consists of the excavation and disposal of all materials in conformity with the lines, grades and dimensions indicated on the drawings, and includes:
  - .1 Trail and borrow excavation
  - .2 Construction of trail ditches, trail, access roads, entrances, embankments, approved haul roads and other earthworks necessary for the the construction of the trail.
  - .3 Removal and disposal of unsuitable materials from excavation, embankment, and borrow areas.
  - .4 Transportation of excavated materials
  - .5 Finishing of top surfaces and slopes
  - .6 Pickup and removal of debris from floodway
  - .7 Maintenance of the work set forth under this section in a finished condition until portion thereof has been accepted by the Departmental Representative.

### **1.03 MEASUREMENT AND PAYMENT PROCEDURES**

- .1 Stripping: measure in cubic metres calculated from cross sections taken by Departmental Representative in areas of excavation.
  - .1 Departmental Representative will take initial cross sections after clearing and grubbing completed.
  - .2 Stripping unit price to include cost of placing material on slopes upon completion of excavation and embankment.
  - .3 Payment for stripping will be done through the Unit Price Tables Item - Stripping
- .2 Common Excavation: Common excavation will not be measured for payment directly, rather it should be be considered incidental to Unit Price Item - Granular Backfill.
- .3 Embankment construction will not be measure for payment under this section and is considered incidental to Unit Price Item - Granular Backfill

- .4 Floodway Debris Removal: Floodway Debris Removal will be paid under the Lump Sum Table Item - Floodway Debris Removal
- .5 No overhaul will be be paid for any of any of the Work covered in this section.
- .6 No separate payment for:
  - .1 Excavating unnecessarily beyond lines established by Departmental Representative, with exception of unavoidable slide material. Do not measure slide material, when such slides are attributable to negligence.
  - .2 Scarifying or benching existing slopes or existing road surfaces.
  - .3 Removing and disposing of roots, stumps and other materials excavated during waste operation.
  - .4 Burying existing culverts from old road.
  - .5 Removing unsuitable material from embankment attributable to negligence.
  - .6 Watering, drying and compacting.
  - .7 Finishing.

#### **1.04 REFERENCES**

- .1 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 1 cubic metre or more.
  - .2 Common Excavation: excavation of materials that are not Rock Excavation or Stripping.
  - .3 Unclassified Excavation: excavation of whatever character other than stripping encountered in the Work.
  - .4 Stripping: excavation of organic material and topsoil covering original ground.
  - .5 Over Haul: authorized hauling in excess of free haul distance that excavated material is moved.
  - .6 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.
  - .7 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.
  - .8 Borrow Material: material obtained from areas outside right-of-way and required for construction of embankments or for other portions of work.
  - .9 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .2 Reference Standards:
  - .1 ASTM International
    - .1 ASTM D 698-07eal, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft<sup>2</sup>) (600 kN-m/m<sup>2</sup>).

## 1.05 QUALITY ASSURANCE

- .1 Regulatory Requirements:
  - .1 Adhere to regulations of authority having jurisdiction when blasting is required.
  - .2 Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved.
- .2 All Quality Control testing by the Contractor

## 2 PRODUCTS

### 2.01 MATERIALS

- .1 Embankment materials require approval by Departmental Representative .
- .2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or other unsuitable material.
- .3 Borrow material:
  - .1 Obtain from sources such as quarry, or borrow pit as approved or as designated by Departmental Representative.
    - .1 Earth Embankment materials to consist of acceptable earth material and processed rock material free from objectionable quantities of organic matter, frozen soil, stumps, trees, moss, and other unsuitable materials.
    - .2 Earth embankment materials will be materials that have been sorted with all stones and particles larger than 150 mm removed from the material
    - .3 The granular material will be processed so that there will be no more than 25 % by volume stones and particles between 100 and 150 mm in diameter. The balance of the granular material will be of a particle size less than 100 mm and be well graded.

## 3 EXECUTION

### 3.01 EXAMINATION

- .1 Verification of Conditions: verify that condition of substrate is acceptable for trail embankment Work:
  - .1 Visually inspect substrate in presence of Departmental Representative .
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### 3.02 COMPACTION EQUIPMENT

- .1 Compaction equipment: vibratory rollers or vibrating plate compactors capable of obtaining required density in materials on project.
  - .1 Demonstrate compaction equipment effectiveness on specified material and lift thickness by documented performance of test-strip before start of Work.
  - .2 Replace or supplement equipment that does not achieve specified densities.
- .2 Operate compaction equipment continuously in each embankment when placing material.

### 3.03 WATER DISTRIBUTORS

- .1 Apply water with equipment capable of uniform distribution.

### 3.04 STRIPPING

- .1 Commence topsoil stripping of areas on approval by the Departmental Representative after clearing and grubbing debris have been removed from these areas.
- .2 Strip topsoil to depths as directed by Departmental Representative. Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Departmental Representative.
- .4 Dispose of unused topsoil as directed by Departmental Representative off site.
- .5 Remove clearing and grubbing debris from stripping.
- .6 Spread organic stripping, on completion of excavation and embankment construction, on slopes and trim or remove from site if quantity exceeds ability to grade on site.

### 3.05 FLOODWAY DEBRIS REMOVAL

- .1 During the flood of 2013, portions of the existing trail was destroyed and pieces of asphalt were transported from the trail right of way into the floodway. The Contractor shall locate and remove all pieces of asphalt from the floodway and haul and dispose of the debris as directed by the Departmental Representative.
- .2 Care is to be taken to keep the disturbance of the natural ground in the floodway to a minimum. Any disturbed ground as a result of the Works shall be restored to original condition (including reseeding) upon completion for the work.
- .3 The Contractor and the Departmental Representative shall review the floodway area effected prior to the commencement of the work to identify the debris to be removed and to assess the condition of the floodway. Once the identified debris has been removed, the Contractor will advise the Departmental



Representative as such so the area can be reviewed and signed off as completed. Any remedial work that is identified that was a result of the debris removal will be rectified at the cost of the Contractor.

### 3.06 EXCAVATING

- .1 General:
  - .1 Notify Departmental Representative when unsuitable trail embankment materials are encountered and remove to depth and extent directed.
  - .2 Sub-excavate below subgrade in cut sections only as directed by Departmental Representative .
    - .1 Compact top 150 mm below sub-excavate to minimum 95% maximum dry density, to ASTM D 698.
    - .2 Replace with approved embankment material and compact to specified embankment density.
  - .3 Treat ground slopes, where subgrade is on transition from excavation to embankment, at grade points in accordance with Drawings.
  - .4 The dimensions of the excavations and embankments shall be in accordance with the typical sections accompanying these specifications. The dimensions of any or all excavations and embankments may be increased or decreased at any time by the Departmental Representative as conditions and circumstances may determine.
- .2 Drainage:
  - .1 Maintain profiles, crowns and cross slopes to provide good surface drainage.
  - .2 Provide ditches as work progresses to provide drainage.
- .3 Borrow Excavation:
  - .1 Completely use in embankments, suitable materials removed from right-of-way excavations before taking material from borrow areas.
  - .2 Obtain embankment materials, in excess of what is available from cut areas, from designated borrow areas.
    - .1 Departmental Representative to designate extent of borrow areas and allowable depth of excavation.
    - .2 Remove waste and stripping material from borrow pits to designated locations.
  - .3 When work is completed, leave borrow area in a condition that is acceptable by the Departmental Representative. Direction will be given as to any reclamation work that may be required upon completion of the work. All costs related to the reclamation of the borrow area if required is considered incidental to the work and will not be measured for payment.

### 3.07 EMBANKMENTS

- .1 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.
  - .1 Method used to be to be pre-approved in writing by Departmental Representative.
- .2 Break up or scarify existing road surface prior to placing embankment material.

- .3 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized.
- .4 Maintain crowned surface during construction to ensure ready run-off of surface water.
- .5 Drain low areas before placing materials.
  - .1 Place and compact to full width in layers not exceeding 150 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.
- .6 Where material consists of rock:
  - .1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 0.6 m.
  - .2 Distribute rock material to fill voids with smaller fragments to form compact mass.
  - .3 Fill surface voids at subgrade level with rock spalls or selected material to form earth-tight surface.

### 3.08 COMPACTION

- .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.
- .2 Deposit, spread, and level, embankment material in layers 150mm maximum thickness before compaction.
  - .1 Compact each layer of embankment until compaction equipment achieves no further significant consolidation.
  - .2 Ensure required compaction for each layer before placing any material for next layer.
- .3 Stones larger than 100 mm in diameter shall not be placed within 150 mm of subgrade elevation.
- .4 Compact each layer to minimum 95% maximum dry density: ASTM D 698 except top 150 mm of subgrade.
  - .1 Compact top 150 mm to 98% maximum dry density.
- .5 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

### 3.09 PROOF ROLLING

- .1 Proof roll using a suitable compaction and proof rolling equipment which is acceptable and useful for the new trail construction work. A small mechanical and machine driven equipment is acceptable for the work. Departmental Representative shall review and approve all proof rolling equipment prior to use on the trail project.
- .2 Proof roll subgrade.
- .3 Make sufficient passes with proof roller to subject surface to three separate passes of the loaded tire. Departmental Representative to determine level

of proof rolling.

- .4 Where proof rolling reveals areas of defective subgrade:
  - .1 Remove subgrade material to depth and extent as directed by the Departmental Representative.
  - .2 Backfill excavated subgrade with common material and compact in accordance to this Section.

### **3.10 FINISHING**

- .1 Shape entire roadbed to within 25 mm of design elevations.
- .2 Finish slopes, ditch bottoms and borrow pits true to lines, grades and drawings where applicable. Scale slope by removing loose fragments, for cut slopes in bedrock .
- .3 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags and ruts.

### **3.11 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.12 PROTECTION**

- .1 Maintain finished surfaces in condition conforming to this section until acceptance by Departmental Representative .
- .2 Provide silt fences and erosion protection as required to mitigate and prevent impacts to adjacent properties.

END OF SECTION

**END OF SECTION**

## **1 GENERAL**

### **1.01 GENERAL**

- .1 The specification is for the supply, delivery, and installation of heavy rip rap. This work shall include all necessary trimming, excavation, and fill required to satisfactorily place the rock riprap, such as:
  - .1 Excavation, trimming and shaping slope from trail to floodway base as indicated on drawings.
  - .2 Excavation of key way as required for riprap place
  - .3 Supply and install geotextile fabric
  - .4 Supply and place rock to lines and grades as specified in drawings

### **1.02 MEASUREMENT AND PAYMENT**

- .1 The quantity of heavy rock riprap to be paid for will be measured in place. The volume of rock paid for will be calculated from the thickness of the riprap as shown on the drawings, and the actual are covered. Overages in thickness or area beyond the limits shown on the drawings will not be paid for unless the changes were requested by the Departmental Representative.
- .2 Payment will be made under the Unit Price Table - Class II Riprap. Payment is by M3 of riprap placed and accepted shall include full compensation for all materials, royalties, permits, haul of materials, equipment, tools, labour and incidentals necessary to complete the work, including preparation of subgrade for riprap, geotextile filter fabric, bedding material, trimming, excavation, backfill as required, and labour for measurement.

## **2 PRODUCTS**

### **2.01 ROCK MATERIAL**

- .1 The rock supplied shall be hard, durable and angular in shape, resistant to weathering and water action, free of overburden, spoil, shale, or shale seams and organic material, and shall meet gradation requirements for the class specified.
- .2 In general, no sandstone will be permitted for all classes.
- .3 The minimum dimension of any single rock shall be not less than one third of its maximum dimension.
- .4 The minimum acceptable unit weight of the rock is 2.5 t/m<sup>3</sup>.
- .5 The Contractor shall provide the Departmental Representative with evidence of the acceptability of the riprap material. Reliable performance records or proposed materials, other than fieldstone, will be considered evidence of acceptability. Angular fieldstone shall be considered to have a reliable performance record, and will be accepted if it meets the gradation requirements.

- .6 Sampling and testing are required for Class 2 and Class 3 rock riprap for which no performance records are available. Sampling and testing are not required for Class 1 riprap and fieldstone.
  - .1 Tests are based on the Durability Index and Durability Absorption Ratio as developed by the State of California, Department of Transportation.
  - .2 The Contractor shall submit samples of the proposed material to an independent certified testing laboratory of his choice and provide written reports of the test results to the Departmental Representative.
  - .3 The reports shall be stamped by a Professional Engineer. The Contractor shall be responsible for all associated cost for rock riprap sample testing including, but not limited to, transporting samples to an independent certified testing laboratory, testing, disposing of samples after testing, and providing written reports to the Consultant.
  - .4 A representative sample of 70 kg minimum is required for each type and source of rock to be tested, and shall contain a number of pieces ranging up to 25 kg mass.
  - .5 The acceptance of rock samples from a particular source or quarry shall not necessarily be construed as constituting acceptance of all material from that location.
- .7 The material provided for each class specified shall have a gradation that conforms to the following:

	CLASS			
	1M	1	2	3
Nominal Mass (kg)	7	40	200	700
Nominal Diameter (mm)	175	300	500	800
None greater than	kg	40	130	700
	or mm	300	450	800
20% to 50%	kg	10	70	300
	or mm	200	350	600
50% to 80 %	kg	7	40	200
	or mm	175	300	500
100% or greater than	kg	3	10	40
	or mm	125	200	300

Percentages quoted are by mass  
 Sizes quoted are equivalent spherical diameters, for guidance only

- .8 Riprap shall meet minimum requirements for specific gravity, absorption and durability:

Method of Test	Requirements
California Department of Transportation Method of Test for Specific Gravity and Absorption of Coarse	Minimum Specific Gravity = 2.60 Maximum Absorption - 2.0%

Aggregate (California  
Test 206)

California Department of                    Minimum Durability Index = 52  
Transportation Method of                  Durability Index may be less than 52  
Test for Durability Index                  if DAR\* > 23  
(California Test 229)

\* Durability Absorption Ratio (DAR) = Durability Index/(Absorption % + 1%)

## **2.02 GEOTEXTILE FILTER FABRIC**

- .1 Non-woven geotextile filter fabric shall be used under all riprap in accordance with the following table of minimum average roll value properties (MARV's) for each specific Class of Riprap:

Non-Woven Geotextile Filter Fabric Specifications and Physical Properties		
	Class 1M, 1 and 2	Class 3
Grab Strength	650 N	875N
Elongation (Failure)	50%	50%
Puncture Strength	275 N	550 N
Burst Strength	2.1 MPa	2.7 MPa
Trapezoidal Tear	250 N	350 N
Minimum Fabric Lap to be 300 mm		

The non-woven geotextile filter fabric shall meet the specifications and physical properties listed above.

## **3 EXECUTION**

### **3.01 GEOTEXTILE FILTER FABRIC**

- .1 Where geotextile filter fabric is specified, the slope shall be graded to provide a smooth, uniform surface to lines indicated on the drawings.
- .2 All stumps, large rock, brush or other debris that could damage the fabric shall be removed. All holes and depressions shall be filled so that the fabric does not bridge them. Loose or unstable soils shall be replaced.
- .3 The fabric shall be laid parallel to the slope direction. It shall be placed in a loose fashion, however folds and wrinkles shall be avoided.
- .4 Adjacent strips of fabric shall be overlapped a minimum of 300 mm, except where placed underwater, the minimum lap shall be 1 m.
- .5 Overlaps shall be pinned using 6 mm diameter steel pins fitted with washers and spaced 1 m intervals along the overlaps.
- .6 The top edge of the filter fabric shall be anchored by digging a 300 mm

trench, inserting the top edge of the fabric and backfilling with compacted soil.

- .7 Care shall be taken to prevent puncturing or tearing of the geotextile. Any damage shall be repaired by use of patches that extend at least 1 m beyond the perimeter of the tear or puncture.
- .8 The fabric shall be covered by rock riprap within sufficient time so that ultraviolet damage does not occur, in no case shall this exceed 7 days for ultraviolet material and 14 days for ultraviolet protected and low ultraviolet susceptible polymer geotextiles.
- .9 Riprap placement shall commence at the base of the blanket area and proceed up the slope. The height of drop of riprap shall be limited to 1.0 m or less, and the riprap shall not be allowed to roll down the slope.
- .10 Heavy equipment will not be permitted to operate directly on the geotextile.

### **3.02 RIPRAP PLACEMENT**

- .1 The rock shall be handled, or placed into position to conform to the specified gradation and to the cross section shown on the drawings.
- .2 The finished surface shall be reasonably uniform, free from bumps or depressions, and with no excessively large cavities below or individual stones projecting above the general surface.
- .3 Do not place Class 2 Riprap by dumping into chutes or by end dumping from haul units or similar units likely to cause segregation of various sizes and damage to the subgrade materials.
- .4 Begin placement at the toe of the slope and proceeding up the slope. Individual stones shall be worked with placement equipment to form a well keyed surface.
- .5 Key in the riprap into the floodway bed at the base of the slope to the specified depth and use the larger rocks in the keyway to anchor the riprap layer.
- .6 Construction equipment is not permitted on the Class 2 surface at any stage of the construction.

### **3.03 INSPECTION OF RIPRAP**

- .1 Control of gradation will be visual inspection.
- .2 The Contractor shall provide a minimum of two samples of rock, of minimum sample size specified below. These samples shall be proven to acceptably conform to the required gradation by direct weighing of all the individual pieces with suitable scales; the mass of each piece in the sample shall be painted on the piece. These samples, located as required by the Departmental Representative at the construction site and at the source site, may be incorporated in the finished riprap when they are no longer required for reference purposes. The samples shall be used for frequent reference

in judging the gradation of the riprap being loaded at the source and placed at the site. The minimum sample size in area shall be as follows:

Class	Mim Sample Size
1M	1m x 1m
1	2m x 2m
2	3m x 3m
3	4m x 4m

- .3 The Contractor shall provide, at no additional cost to the Departmental Representative, whatever facilities are required to assist the Departmental Representative in checking gradation and measuring riprap in place. If, during the delivery of the material to the site, a particular load is found to be made up of pieces predominantly one size, or lacking in pieces of one size, it shall be dumped in a suitable location outside the area to be protected.
- .4 Additional material as required to make up the deficient sizes shall be added to this load such that the combination can then be placed to ensure uniformity.

**END OF SECTION**



## **1 GENERAL**

### **1.01 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION**

- .1 Departmental Representative to supply granular base material at borrow area in park. The contractor will be responsible for excavation, hauling, and placing the material as well as reclamation of the borrow area.

### **1.02 DESCRIPTION**

- .1 The work covered under this section includes:
  - .1 Preparation of subgrade for placement of granular materials
  - .2 Excavation of granular materials in borrow area.
  - .3 Load and haul excavated granular backfill materials.
  - .4 Place and compaction of granular backfill materials to construct the trail sub-base embankment to the lines and grades specified on the drawings.
  - .5 Reclamation and hydroseed of the borrow area used for gravel extraction as directed by the Departmental Representative.

### **1.03 MEASUREMENT AND PAYMENT**

- .1 The Quantity of Granular Backfill for which payment shall be made shall be the the number of cubic meters (m3) of granular materials incorporated into the Work to build the sub-base embankment for the trail and accepted by the Departmental Representative. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
- .2 Payment for Granular Backfill will be under the Unit Price Table Item - Granular Backfill and will encompass all labour, equipment, materials, hauling, and excavation required to place granular backfill to the lines and grades specified on the drawings.
- .3 Supply, excavation, loading, hauling, placing, compacting, water for compaction and drying will be incidental to the work.
- .4 No overhaul will be paid for this Work.

### **1.04 RELATED REQUIREMENTS**

- .1 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours.
- .2 Section 01 35 43 - Environmental Procedures.
- .3 Section 31 24 14 - Trail Excavation, Embankment and Compaction
- .4 Section 32 11 14 - Granular Base Course.

## **1.05 REFERENCES**

- .1 ASTM International
  - .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>2</sup>) (600kN-m/m<sup>2</sup>).
  - .5 ASTM D 1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>2</sup>) (2,700kN-m/m<sup>2</sup>).
  - .6 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

## **1.06 QUALITY CONTROL**

- .1 All Quality Control testing by the Contractor.

## **1.07 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Divert unused granular material to a pit location approved by the Departmental Representative.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 The granular backfill material will be excavated and processed from a borrow area provided the Contractor by the Departmental Representative.
- .2 The Granular Backfill will be comprised of gravel materials excavated and processed to the following specification:
  - .1 No particles will have a diameter in excess of 150 mm.
  - .2 The granular backfill will not have more than 25 % by volume particles having a diameter between 100mm and 150mm.
  - .3 The balance of the particle size for granular backfill will be less than 100 mm and be well graded.

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### **3 EXECUTION**

#### **3.1 PREPARATION**

#### **3.02 PLACEMENT AND INSTALLATION**

- .1 Place granular backfill after subgrade surface is inspected and approved in writing by Departmental Representative.
- .2 Placing:
  - .1 Construct granular sub-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 (layers) 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 98% corrected maximum dry density maximum dry density to ASTM D 1557.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.
  - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .5 Proof rolling:
  - .1 Proof rolling may be required to prove an area before placing of base materials and/or asphalt, at the discretion of the Departmental Representative.
  - .2 Obtain written approval from Departmental Representative to use non standard proof rolling equipment.
  - .3 Proof roll at level in granular base as indicated.
    - .1 If use of non standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.
  - .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
  - .5 Where proof rolling reveals areas of defective subgrade:

- .1 Replace sub-base material and compact in accordance with this section.
- .2 Replace base material and compact in accordance with this Section.
- .6 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with this section at no extra cost.

### 3.03 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

### 3.04 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

**END OF SECTION**

## 1 GENERAL

### 1.01 DESCRIPTION

- .1 The work covered under this section includes:
  - .1 Preparation of sub-base for placement of 20 mm Base Course
  - .2 Supply and haul 20 mm Base Course materials.
  - .3 Place and compaction of 20 mm base course materials to construct the trail base to the lines and grades specified on the drawings.

### 1.02 MEASUREMENT AND PAYMENT

- .1 The Quantity of 20 mm Base Course Material for which payment shall be made shall be the the number of cubic meters (m3) of 20 mm base course material incorporated into the Work to build the base course for the trail and accepted by the Departmental Representative. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
- .2 Payment for 20 mm Base Course will be under the Unit Price Table Item - 20 mm Base Course Material and will encompass all labour, equipment, materials, hauling, and excavation required to supply and place 20 mm base course materials to the lines and grades specified on the drawings.
- .3 Supply, excavation, loading, hauling, placing, compacting, water for compaction and drying will be incidental to the work.
- .4 No overhaul will be paid for this Work.

### 1.03 RELATED REQUIREMENTS

- .1 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours.
- .2 Section 01 35 43 - Environmental Procedures.
- .3 Section 31 24 14 - Trail Excavation, Embankment and Compaction
- .4 Section 32 11 14 - Granular Base Course.

### 1.04 REFERENCES

- .1 ASTM International
  - .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction

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- Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>2</sup>) (600kN-m/m<sup>2</sup>).
  - .5 ASTM D 1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>2</sup>) (2,700kN-m/m<sup>2</sup>).
  - .6 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
  
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
    - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

### **1.05 QUALITY CONTROL**

- .1 All Quality Control testing by the Contractor.

### **1.06 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Divert unused granular material to a pit location approved by the Departmental Representative.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 The contractor is responsible to locate a source outside the park and supply 20 mm base course material that meets AT Designation 2 Class 20 base aggregate. The contractor will be responsible for all charges related to the sourcing and supply of this material.

## **3 EXECUTION**

### **3.1 PREPARATION**

### **3.02 PLACEMENT AND INSTALLATION**

- .1 Place 20 mm Base Course material after sub-base surface is inspected and approved in writing by Departmental Representative.
- .2 Placing:
  - .1 Construct 20 mm 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 100 mm

- compacted thickness.
- .1 Departmental Representative may authorize thicker lifts (layers) 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 98% corrected maximum dry density maximum dry density to ASTM D 1557.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.
  - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .5 Proof rolling:
- .1 Proof rolling may be required to prove an area before placing of base materials and/or asphalt, at the discretion of the Departmental Representative.
  - .2 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730mm.
  - .3 Obtain written approval from Departmental Representative to use non standard proof rolling equipment.
  - .4 Proof roll at level in granular base as indicated.
    - .1 If use of non standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.
  - .5 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
  - .6 Where proof rolling reveals areas of defective subgrade:
    - .1 Replace base, sub-base and subgrade material to depth and extent as directed by Departmental Representative.
    - .2 Backfill excavated subgrade material with granular backfill and compact in accordance to Section 32 11 19 - Granular Backfill.
    - .3 Replace excavated sub-base material with granular backfill and compact in accordance to Section 32 11 19 - Granular Backfill.
    - .4 Replace base material and compact in accordance with this Section.
  - .7 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with this section at no extra cost.

**3.03 SITE TOLERANCES**

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

**3.04 PROTECTION**

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

**END OF SECTION**



**Part 1            General**

**1.1            SECTION INCLUDES**

- .1            Materials and application of asphalt prime to granular base surface prior to asphalt paving as approved by the Departmental Representative.

**1.2            RELATED SECTIONS**

- .1            Section 01 33 00 - Submittal Procedures.
- .2            Section 01 35 43 - Environmental Procedures.
- .3            Section 32 12 16 – Asphalt Concrete Pavement

**1.3            MEASUREMENT PROCEDURES**

- .1            Supply, Delivery and Application of asphalt prime will be will not be measured separately and will be considered incidental to **“Unit Price Item - Asphalt Trail Surfacing”**.

**1.4            REFERENCES**

- .1            American Society for Testing and Materials International, (ASTM)
  - .1            ASTM D140-01, Standard Practice for Sampling Bituminous Materials.
- .2            Canadian General Standards Board (CGSB)
  - .1            CAN/CGSB-16.1-M89, Cutback Asphalts for Road Purposes.
  - .2            CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

**1.5            SUBMITTALS**

- .1            Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2            Submit two - 1 L samples of asphalt prime proposed for use in new, clean, air tight sealed, wide mouth, bottles made with plastic, to Departmental Representative, at least 2 weeks prior to commencing work.
- .3            Sample asphalt prime coat materials in accordance with ASTM D140.
- .4            Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work, in accordance with ASTM D140.

**1.6            QUALITY ASSURANCE**

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

**1.7            DELIVERY, STORAGE AND HANDLING**

- .1            Deliver, store and handle materials to ASTM D140.
- .2            Provide, maintain and restore asphalt storage area.

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**1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 35 43 - Environmental Procedures and with the Waste Reduction Work Plan.
- .2 Divert unused asphalt materials to facility capable of recycling materials.

**Part 2 Products**

**2.1 MATERIAL**

- .1 Asphalt material: to CAN/CGSB-16.1 grade: RM-20, MC-30, MC-250. CAN/CGSB-16.2 grade: SS-1.
- .2 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.
- .3 Water: clean, potable, free from foreign matter.

**2.2 EQUIPMENT**

- .1 Pressure distributor to be:
  - .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 3 m.
    - .3 Applied at controlled rates from 0.2 to 5.4 L/m<sup>2</sup> with uniform pressure, and allowable variation from any specified rate not exceeding 0.1 L/m<sup>2</sup>.
    - .4 Distributed in uniform spray without atomization at temperature required.
  - .2 Equipped with meter registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
  - .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
  - .4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
  - .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.
  - .8 Cleaned if previously used with incompatible asphalt material.

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**Part 3            Execution**

**3.1                APPLICATION**

- .1 Obtain Departmental Representative's approval of granular base surface before applying asphalt prime.
- .2 Cutback asphalt:
  - .1 Heat asphalt prime to a temperature for pumping and spraying as recommended by the supplier.
  - .2 Apply asphalt prime to granular base at rate recommended by the supplier and approved by the Departmental Representative.
  - .3 Apply on dry surface unless otherwise directed by Departmental Representative.
- .3 Anionic emulsified asphalt:
  - .1 Dilute asphalt emulsion with clean water at 1:1 ratio for application.
  - .2 Mix thoroughly by pumping or other method approved by Departmental Representative.
  - .3 Apply diluted asphalt emulsion at rate recommended by the supplier and approved by the Departmental Representative.
  - .4 Apply diluted asphalt emulsion on damp surface unless otherwise directed by Departmental Representative.
- .4 Apply asphalt prime only on unfrozen surface.
- .5 Do not apply prime when air temperature is less than 10 degrees C or when rain is forecast within 2 hours.
- .6 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt prime material.
- .7 Where traffic is to be maintained, treat no more than one-half width of surface in one application.
- .8 Prevent overlap at junction of applications.
- .9 Do not prime surfaces that will be visible when paving is complete.
- .10 Apply additional material to areas not sufficiently covered as directed by Departmental Representative.
- .11 Keep traffic off primed areas until asphalt prime has set.
- .12 Permit prime to set before placing asphalt paving.

**3.2                USE OF SAND BLOTTER**

- .1 If asphalt prime fails to penetrate within 24 hours, spread sand blotter material in amounts required to absorb excess material.
- .2 Allow sufficient time for excess prime to be absorbed.
- .3 Apply second application of sand blotter as required.

Project  
Banff Legacy Trail Flood  
Repairs  
Banff National Park

ASPHALT PRIME COAT

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**END OF SECTION**

**Part 1 GENERAL NOTE: ASPHALT TO BE SUPPLIED BY CONTRACTOR.**

**1.1 PRODUCTS TO BE SUPPLIED UNDER THIS SECTION:**

- .1 AT Designation Class 16 Asphalt Aggregate to be supplied by the Contractor from Asphalt Plants located outside Banff National Park.
- .2 RELATED SECTIONS
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 31 – Special Procedures for Traffic Control and Construction Detours
  - .3 Section 01 35 43 - Environmental Procedures.
  - .4 Section 31 24 14 - Roadway Excavation, Embankment and Compaction.
  - .5 Section 32 11 19 – 50 mm Granular Sub-base Course.
  - .6 Section 32 11 24 – 20 mm Granular Base Course.
  - .7 Section 32 12 14 - Asphalt Prime.

**1.1 DESCRIPTION**

- .1 Hot Mix Asphalt Concrete Pavement (HMACP) shall consist of supplied AT Designation Class 16 Asphalt Aggregate and asphalt cement, combined in a hot mix plant as hereinafter specified, placed and compacted to the specified density on a prepared surface in conformity to the lines, grades, dimensions and cross-sections as shown on the Drawings or as directed by the Departmental Representative.

**1.2 MEASUREMENT PROCEDURES, UNIT PRICE ADJUSTMENTS AND PENALTY ASSESSMENTS**

- .1 Accepted HMACP will be measured in square meters and will be paid for at the unit price for Asphalt Concrete Pavement subject to unit price adjustments and assessments hereinafter specified. Payment shall be compensation in full for supply of asphalt concrete mix including all materials, supply and application of prime/tack coat, processing, Plant mixing, supply, loading, hauling, paver laying, compacting, finishing surface, raking, interim lane marking, quality control testing, safety, and maintenance. **Payment shall be under “Unit Price Item – Asphalt Trail Surfacing”.**
- .2 Supply of anti-stripping agent(s) IF REQUIRED and approved by the Departmental Representative, will be paid under “Prime Cost Sum:”. The Prime Cost Sum, as set out in the Unit Price Table, is not to be considered a sum due to the Contractor; rather, it is a sum against which payment will be made to the Contractor as supported by supplier invoices and weight tickets.
- .3 Removal and Disposal of Fillet and Ramp Material. The removal and disposal of fillet and/or ramp material will be considered incidental to the Work and will not be paid for separately. Material is to be disposed of as directed by the Departmental Representative.
- .4 The following end product properties of the HMACP will be measured for acceptance in accordance with Section 2.3.4, Acceptance Sampling and Testing.

- .1 Density.
- .2 Actual Asphalt Content.
- .3 Gradation.
- .4 Smoothness.
- .5 Segregation

**1.3 DEFINITIONS**

- .1 Asphalt Cement: specified type and grade of asphalt binder used in HMA CP.
- .2 Asphalt Concrete Mix Aggregates: aggregates after the combination of all processed aggregates used in HMA CP.
- .3 Asphalt Concrete Mix: high quality, carefully controlled, hot plant mix of asphalt cement and dense graded, high quality crushed coarse aggregate, and RAP (if applicable), blend sand material(s) as required, used in HMA CP.
- .4 Hot Mix Asphalt Concrete Pavement (HMA CP): paver laid, asphalt concrete mix placed and compacted on a prepared surface in conformity to the lines, grades, dimensions and cross-sections as shown on the Drawings or as directed by the Departmental Representative.
- .5 Job Mix Formula: the job mix formula establishing the aggregate proportioning, target aggregate gradation, and approved design asphalt cement content to be used for production of HMA CP which requires the written approval of the Departmental Representative, on the basis of a **Contractor submitted mix design**.
- .6 Quality Control: The sum of all Contractor activities to ensure a product meets contract specification requirements which may include material handling and construction procedures, calibration and maintenance of equipment, production process control and any sampling, testing and inspection that is done for these purposes. **The Contractor is entirely responsible for quality control.**
- .7 Quality Assurance: The Departmental Representative’s sampling and testing of the end product for the purpose of determining acceptance/rejection and payment. Unless otherwise specified, the latest edition of the following standard Alberta Transportation test methods (ATT) indicated below will be used:

	TEST DESCRIPTION	TEST METHOD
1	Sampling Mixes	ATT-37
2	Coring	ATT-5
3	Extraction	ATT-12
4	Correction Factor, Extracted Asphalt Content	ATT-12 Part III
5	Percent Fracture	ATT-50
6	Sieve Analysis	ATT-26
7	Density, Immersion Method, Waxed Asphalt Concrete Specimens	ATT-6
8	Density, Immersion Method, Saturated Surface Dry Asphalt Concrete Specimens	ATT-7

9	Voids Calculations, Asphalt Concrete Specimens	ATT-36
10	Percent Compaction, Asphalt Concrete Pavement	ATT-67
11	Forming Marshall Specimens, Field Method	ATT-13
12	Moisture Content, Oven Method Asphalt Concrete Mixes	ATT-15
13	Smoothness of Pavements, Profilograph Method	ATT-59
14	Stratified Random Test Sites for A.C.P. Projects	ATT-56
15	Appeal Testing, Asphalt Content, Density and Gradation	ATT-68
16	Asphalt Content, Ignition Method	ATT-74
17	Correction Factor, Ignition Asphalt Content	ATT-74 Part II
18	Asphalt Content	AASHTO T164 , T287 or ATT-12 or ATT-74
19	Segregation	Paving Guidelines and Segregation Rating Manual
20	Theoretical Film Thickness (Ft)	TLT-311

.8 AAceptance Limits:

- .1 Acceptance limits for Density are the limiting values of the Lot Mean within which a Lot will be accepted at full, increased, or reduced payment for Density, as shown in Table No. 1.
- .2 Acceptance limits for Actual Asphalt Content are the limiting values of the Lot Mean within which a Lot will be accepted at full or reduced payment, as shown in Table No. 2.

.9 Asphalt Content:

- .1 Design Asphalt Content: the asphalt cement content as established by the submitted mix design, and as approved in writing by the Departmental Representative.
- .2 Approved Asphalt Content: the design asphalt cement content or subsequent adjustments to it, as approved in writing by the Departmental Representative.
- .3 Actual Asphalt Content: The amount of asphalt cement in the asphalt concrete mix as determined by testing done under the Departmental Representative's quality assurance program and includes an amount to correct for the asphalt cement lost due to absorption by the aggregates. This correction will be determined for each change in aggregate or asphalt binder.

.10 End Product Specification (EPS):

A specification that does not specify methods of construction. Under EPS, the end

product will be accepted or rejected according to a specified acceptance plan. The Departmental Representative will monitor the Contractor's control of process that produces the items of construction. The Contractor is entirely responsible for quality control during production and placement of HMA CP. The end product acceptance is the responsibility of the Departmental Representative and includes a statistically oriented program of acceptance testing.

.11 Lot:

A Lot is a portion of Work being considered for acceptance and is defined as follows:

- .1 One day's plant production of more than four hours where approved changes of the following criteria have not occurred:
  - .1 Job Mix Formula.
  - .2 Pavement Density requirement.
  - .3 Project.

A change in any one of the above may require a new Lot designation.

- .2 One day's plant production of less than four hours will be dealt with as follows:
  - .1 The material will be added to the previous day's Lot with the same criteria as specified in 1.2.12.1 unless testing indicates that mix is subject to unit adjustment. Then this production will be designated as a Lot.
  - .2 If it is the last time the mix is produced with these criteria then the production will be designated as a Lot.
  - .3 If the Departmental Representative suspects a portion of a Lot is substandard; he may order extra testing to define the area and severity of the deficiency. A new Lot will be designated for this portion if the extra testing indicates the HMA CP is subject to unit price adjustment or rejection.

.12 Lot Mean and Range

Lot Mean is the arithmetic mean of a set of five or more test results constituting the sample for the Lot. The Range represents the difference between the highest and lowest values within the previously noted set of test results.

.13 Stratified Random Sample

A set of test measurements taken one each from five or more separate (stratified) areas or segments within a Lot, in an unbiased way.

.14 Rejection Limit

- .1 Density and Actual Asphalt Content - Rejection limit for density and actual asphalt content is the limiting value of the Lot Mean beyond which a Lot is rejected and not paid for as shown in Table No.'s 1 and 2.
- .2 Gradation - Rejection limit for gradation is the limiting value of the Lot mean beyond which a Lot is rejected and not paid for as shown in Table No. 3.
- .3 Smoothness - Rejection limit for smoothness is the limiting value of the Profile Index (PrI) beyond which a Lot is rejected and not paid for as shown in Table No. 4.



.15 Segregated Area

- .4 An area of the pavement where the texture differs visually from the texture of the surrounding pavement. For the purposes of classifying pavement segregation, only segregated areas greater than 0.1 sq. m. and centre-of-paver streaks greater than 1 m in length will be considered. Moderate or severe segregated areas which do not meet these size parameters will be considered obvious defects.

.16 Segregation Severity

- .1 None - Completely uniform surface texture; the matrix of asphalt and fine aggregate is in place between the coarse aggregate.
- .2 Slight - The matrix, asphalt cement, and fine aggregate is in place between the coarse aggregate. However there is more stone in comparison to the surrounding acceptable mix.
- .3 Moderate - Significantly more stone is visible than in the surrounding acceptable asphalt concrete; moderately segregated areas usually exhibit a lack of continuous contact with the surrounding matrix.
- .4 Severe - Appears as an area of very stony mix, with stone against stone with very little or no matrix.
- .5 Centre-of- Paver Streak - Appears as a continuous or semi-continuous longitudinal “streak” typically located in the middle of the paver “mat”.

.17 Surface Defects are identified as:

- .1 Individual bumps and dips that are 12 mm or greater. Bumps and dips between 8 and 12 mm will be subject to a penalty per bump or dip.
- .2 Areas of segregation greater than 0.1 sq. m.
- .3 Areas containing excess or insufficient asphalt cement.
- .4 Improper matching of longitudinal and transverse joints on the final lift of the HMA CP.
- .5 Roller marks in final lift of the HMA CP.
- .6 Cracking or tearing of the HMA CP.
- .7 Tire marks in the surface of the HMA CP.
- .8 Sampling locations not properly repaired.
- .9 Improperly constructed patches.

**1.4 REFERENCES**

- .1 ASTM International (ASTM).
  - .1 ASTM C 88, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .2 ASTM C 117, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

- .3 ASTM C 123, Test Method for Lightweight Pieces in Aggregate.
- .4 ASTM C 127, Test Method for Specific Gravity and Absorption of Coarse Aggregate.
- .5 ASTM C 128, Test Method for Specific Gravity and Absorption of Fine Aggregate.
- .6 ASTM C 131, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .7 ASTM C 136, Method for Sieve Analysis of Fine and Coarse Aggregates.
- .8 ASTM D 995, Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .9 ASTM D 1559, Test Method for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
- .10 ASTM D 2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .11 ASTM D 3203, Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .12 ASTM D 4791, Test Method for Flat and Elongated Particles in Coarse Aggregate.
- .13 ASTM D 6373, Standard Specification for Performance Graded Asphalt Binder.
- .14 ASTM E1274, Standard Test Method for Measuring Pavement Roughness Using a Profilograph
- .2 Asphalt Institute (AI).
  - .15 Asphalt Institute MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types Sixth Edition.
- .3 Association of American State Highway and Transportation Officials (AASHTO).
  - .1 AASHTO M320, Performance-Graded Asphalt Binder
  - .2 AASHTO T40, Standard Method for Sampling Bituminous Materials
  - .3 AASHTO T164, Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

## **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Place materials defined as hazardous and toxic in designated containers.
- .3 Remove from site and dispose of hazardous or toxic materials at appropriate recycling facility.

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**1.6 END PRODUCT ACCEPTANCE OR REJECTION**

- .1 General: The Contractor shall provide an HMA CP end product conforming in quality and accuracy of detail to dimensional and tolerance requirements of specifications and Drawings. Where no tolerances are specified, standard of workmanship shall be in accordance with normally accepted good practice.
- .2 End Product Acceptance.
  - .1 Acceptance at Full or Increased Payment - Acceptance of any Lot at full or increased payment will occur if it contains no obvious defects and if:
    - .1 the Lot Mean for Density of the compacted asphalt concrete mix in the Lot is not in penalty or rejection according to the criteria outlined in Table No. 1.
    - .2 the Lot Mean for Actual Asphalt Content of mix, obtained by extraction, is within 0.3 of the Approved Asphalt Content;
    - .3 For Smoothness, full payment will occur if the Profile Index of all the Lot, in the top lift of pavement, are not in penalty or rejection according to the criteria outlined in Table No. 4. Increased payment will occur if the Profile Index of all lots in the Lot, in the top lift of pavement, are zero.
    - .4 Individual bumps and dips in top lift of pavement do not exceed 8 mm.
    - .5 For gradation, full payment will occur if there are no Lot Mean Adjustments for gradation and increased payment will occur if there are no Lot Mean Adjustments and the Maximum range as shown in Table No. 5 is not exceeded for any sieve size in the Lot.
- .3 End Product Rejection
  - .1 If the Lot Mean for Density, Actual Asphalt Content or Gradation are outside the applicable acceptance limits, then the Lot is rejected automatically, regardless of the values of the other control characteristics.
  - .2 If the smoothness of the top lift of any lot is outside the acceptance limit, then the lot is rejected automatically, regardless of the values of the other control characteristics.
  - .3 The finished surface of any lift shall have a uniform close 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, will be cause for automatic rejection of asphalt concrete pavement regardless of the values of any other control characteristic:
    - .1 individual bumps and dips that exceed 12 mm. The Departmental Representative may reject asphalt concrete pavement with individual bumps and dips exceeding 8 mm and less than 12 mm.
    - .2 segregated areas not already covered in Section 1.6.3.
    - .3 areas of excessive or insufficient asphalt cement.
    - .4 improper matching of longitudinal and transverse joints.
    - .5 roller marks.

- .6 tire marks.
- .7 cracking or tearing.
- .8 improperly repaired sampling locations.
- .9 improperly constructed patches.

When asphalt concrete pavement is rejected by reason of obvious defects, the minimum area of rejection will be the Lot size defined in Section 1.2.12 of this specification.

- .4 Rejected work shall be promptly repaired, remedied, overlaid, or removed and replaced all 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 which has been rejected, until the defects have been remedied.

## 1.7 MEASUREMENT AND PAYMENT

### .1 General

The unit prices for the following items of work shall be full compensation for all supply of materials, all labour, material, tools, equipment, and incidentals necessary to complete the work in accordance with these specifications.

- .2 Hot Mix Asphalt Concrete Pavement Materials shall be supplied by Contractor and is to haul and deliver to the Banff Legacy Trail job site and completely install within the trail area.

## Part 2 Products

### 2.1 MATERIALS

#### .1 Aggregate:

- .1 **Supplied by the Contractor.** Mix design using aggregates is included with the tender package
- .2 Contractor has to carry out its own mix design using the aggregate supplied .

#### .2 Asphalt Cement

- .1 **Supplied by the Contractor.** Asphalt cement in accordance with Table No. 11.
- .2 Any change in asphalt cement type or grade must be approved by the Departmental Representative.
- .3 Asphalt cement shall conform to all applicable requirements of this specification and AASHTO M320, Performance-Graded Asphalt Binder.

#### .3 Responsibility for Mix Design

- .1 Preparing and submitting the asphalt mix design(s) is the responsibility of the Contractor. All costs incurred in mix design formulation are the responsibility of Contractor. Shipping costs for samples sent to the Departmental

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- Representative for verification and approval of the mix design(s) are responsibility of Contractor.
- .2 The Contractor shall use a professional engineering company and a qualified testing laboratory, licensed to practice in Alberta, to assess the aggregate materials proposed for use and to carry out the design of the asphalt concrete mix.
- .4 Requirements for Mix Design(s)  
The asphalt concrete mix design shall follow Marshall Method of Mix Design as outlined in latest edition of the Asphalt Institute Manual Series No. 2 (MS-2). Mix design, at the Design Asphalt Content, shall meet all the requirements in Table No. 11 for the asphalt concrete mix indicated.
- .5 Approval of Mix Design.  
The Contractor shall submit the mix design(s) to the Departmental Representative for approval. The Contractor's submission shall include the following information:
- .1 Aggregate source name(s) and location(s).
- .2 Gradation of each aggregate to be used in the asphalt concrete mix.
- .3 Percentage by mass of each aggregate to be used in the asphalt concrete mix.
- .4 Mix design gradation of the combined aggregates.
- .5 Aggregate characteristics including sand equivalent, percentage of fractured faces, bulk specific gravity, L.A. Abrasion Loss, and Plasticity Index when combined at the mix design gradation..
- .6 All Marshall mix design characteristics, including all mix void properties and graphs used in arriving at the final mix design, bulk specific gravity of combined aggregates, and asphalt absorption of combined aggregates.
- .7 Recommended Design Asphalt Content expressed as a percentage by dry weight of aggregate.
- .8 Maximum theoretical specific gravity of the asphalt concrete mix, at the recommended design asphalt content, and at asphalt contents considered above and below design asphalt content.
- .9 Identification of each asphalt supplier by name, location and type and grade of asphalt cement to be supplied.
- .10 For each asphalt cement supplied, a current typical analysis, temperature-viscosity chart, the specific gravity, and the recommended mixing and compaction temperatures for the preparation of the mix design specimens.
- .11 For mix design submissions using RAP include the RAP source name(s) and location(s), all RAP asphalt content and gradation test results, the bulk specific gravity of the RAP aggregates, the percentage of RAP to be used in the asphalt concrete mix, and the rheological test results of the extracted and recovered RAP asphalt cement, the design rheology, and all blending charts used. The scheduling of Asphalt Pavement Removal will not allow for RAP materials being used on this project.

- .12 The laboratory determined correction factor to account for the un-extracted asphalt cement due to absorption by the aggregates.
- .6 Verification of Mix Design.
  - .1 Provide representative samples of each of the aggregate components, including RAP if used, and asphalt cement for verification purposes. A sufficient quantity of each component shall be provided to result in a 100 kg sample of combined aggregate at design proportions. The Departmental Representative will require up to five working days from time of receipt of sample to verify the mix design. Cost of such mix design verification will be borne by the Departmental Representative.
  - .2 As a part of asphalt mix design evaluation, the Departmental Representative may determine the following properties:
    - .1 Bulk Specific gravity for asphalt mix aggregate.
    - .2 Marshall Density.
    - .3 Theoretical maximum specific gravity of asphalt mix at design asphalt content and at each asphalt content considered by Contractor above and below design asphalt content.
  - .3 Difference between property values submitted by Contractor and property values as determined by the Departmental Representative shall not exceed the amounts shown in Table 11.
  - .4 The asphalt mix design(s) shall be rejected if maximum permissible variations are exceeded.
  - .5 Any change in nature or sources of aggregate(s), or where a new mix design is desired by the Contractor, a complete mix design will be required. This new mix design shall be subject to the approval of the Departmental Representative.
  - .6 The Departmental Representative will not accept any asphalt concrete mix produced prior to the Contractor receiving written approval of the mix design from the Departmental Representative.
  - .7 Aggregate proportioning and asphalt content for the approved mix design will form the job mix formula for the production of asphalt concrete mix.
  - .8 The Contractor shall be totally responsible for production of aggregates and asphalt concrete mixes in conformance with the specifications.
- .7 Variation from Approved Job Mix Formula
  - .1 After the job mix formula gradation and proportioning of various aggregate sizes have been established and approved, no alteration will be permitted.
  - .2 The Lot Mean Marshall air voids shall not vary from approved mix design air voids by more than 0.5%.
  - .3 If there are any deviations from the approved job mix formula, or any alterations of aggregate proportioning, the Departmental Representative will determine if a new mix design is required.

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- .4 Any deviation whatsoever from the approved job mix formula shall require the prior written approval of the Departmental Representative and the Departmental Representative will not accept any asphalt mix produced prior to this approval.
  - .5 If the sum of any approved deviations are in excess of any one of the following limits away from the approved job mix formula, a new mix design is required:
    - +/-5% passing the 5,000  $\mu\text{m}$  sieve;
    - +/-1.0% passing the 80  $\mu\text{m}$  sieve;
    - +/-0.3% asphalt cement content; and/or
    - +/- 1.0% in target proportion of RAP.
  - .6 Any change in the approved job mix formula shall not result in a Theoretical Film Thickness value less than specified in Table No. 11.

## 2.2 ACCEPTANCE SAMPLING AND TESTING

- .1 General
  - .1 During the progress of the Work, tests will be carried out on materials and workmanship in order to ensure compliance with the requirements of the specifications.
  - .2 Where it is required in these specifications that the Contractor submit samples of materials or mixtures to the Departmental Representative for approval, these samples shall be submitted in sufficient time for proper testing.
  - .3 The Departmental Representative's approval of any materials or mixture shall in no way relieve the Contractor from his obligation to provide materials, mixtures, and workmanship in accordance with the specifications.
  - .4 Where specified, random sampling procedures shall be followed, and where no specific random sampling procedure is specified the sampling procedure shall be as identified by the Departmental Representative in the case of acceptance testing and by the Contractor in the case of quality control testing.
  - .5 The Departmental Representative shall have access to the Work at all times for taking samples. The Contractor shall provide any assistance necessary for taking samples and shall reinstate pavement layers or other structures to the satisfaction of the Departmental Representative at the positions where samples have been taken. Compensation for providing assistance with sampling and for reinstatement where samples are taken shall be included in the unit price bid for the various items of Work tested and no separate payment will be made.
  - .6 The Contractor shall provide and prepare, to the satisfaction of the Departmental Representative, a suitable site for the parking of a mobile laboratory trailer. The Contractor shall provide a continuous supply of water and power to the mobile laboratory trailer, at his own expense.
- .2 Methods of Testing for Acceptance and Appeal Testing
  - .1 Unless otherwise specified, the latest edition of the applicable ASTM or AASHTO standards will be used to determine material characteristics.

- .1 In all test methods used as reference in this specification, metric sieves as specified in Canadian General Standards Board Specification 8-GP-2M shall be substituted for any other specified wire cloth sieves Table No. 13.
  - .2 In all cases the latest amendment or revision current at the closing date of the tender is implied when reference is made to one of the above standards in the specification.
- .3 Quality Control Testing
- .1 Quality control testing is the responsibility of the Contractor throughout every stage of the Work from the crushing and production of aggregates to the final accepted product. Tests performed by the Departmental Representative will not be considered to be quality control tests.
  - .2 The Contractor shall provide and pay for equipment and qualified personnel to obtain all quality assurance core samples and perform all quality control testing necessary to determine and monitor the characteristics of the materials produced and incorporated into the work, and the final product produced.
  - .3 If the Contractor elects to use RAP, the asphalt content and gradation of the RAP shall be determined at a minimum frequency of one per 1,000 tonnes of RAP and a minimum of ten samples shall be tested for each RAP source.
  - .4 When required by the Departmental Representative, the RAP rheology shall be determined at a minimum frequency of one per 5,000 tonnes of RAP and a minimum of three samples shall be tested for each RAP source.
  - .5 Test methods are described in Section 2.3.2, Methods of Testing for Acceptance and Appeal Testing. Minimum testing frequencies of quality control testing are listed in Table No. 12. The Departmental Representative may require an increase in the frequency of any quality control test, which the Contractor has proposed. The Contractor shall arrange and pay for any additional tests required by the Departmental Representative.
  - .6 Results of all quality control tests shall be submitted to the Departmental Representative as they become available. In addition, the quality control test results for mix asphalt content and aggregate gradation shall be provided to the Departmental Representative no later than 12:00 noon of the day following placement.
  - .7 The Contractor shall bear the cost of all consulting services retained by him.
  - .8 The Contractor shall be totally responsible for production of aggregate and mixes that meet all the specified requirements.
- .4 Acceptance Sampling and Testing
- .1 General: Within this specification, certain requirements, limits, and tolerances are specified regarding the quality of materials and workmanship to be supplied. Compliance with these requirements where so specified, shall be determined by statistical testing as described in this section.
  - .2 Acceptance testing is the responsibility of the Departmental Representative.



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- .3 The Contractor shall provide to the Departmental Representative all quality assurance density cores and any additional cores requested by the Departmental Representative for quality assurance testing for asphalt content and gradation by 12:00 noon of the day following placement, unless otherwise permitted by the Departmental Representative.
  - .4 Prior to the Contractor obtaining the cores, the Departmental Representative may provide the Contractor with new or different random sample locations. The Departmental Representative may have the Contractor obtain cores for quality assurance testing at any time throughout the project for any Lot.
  - .5 All cores provided to the Departmental Representative shall be in their original condition. Core preparation or sawing shall be done by the Departmental Representative.
  - .6 All costs associated with pavement coring for both quality control and quality assurance testing shall be the responsibility of the Contractor.
  - .7 Initial acceptance testing will be performed free of cost to the Contractor. The Contractor shall be responsible for the cost of all quality assurance testing performed on material that is used to replace or overlay material that has been previously rejected.
  - .8 The Contractor shall be responsible for the cost of all quality assurance retesting performed following attempts to improve smoothness or to remove bumps or dips.
  - .9 After all quality control tests for the Lot are reported to the Departmental Representative, the Departmental Representative will provide the Contractor with a copy of the results of acceptance tests within one working day of their availability.
  - .10 If the Departmental Representative determines that certain test results are faulty due to testing equipment malfunction, improper testing procedures, or calculations, he will replace the faulty tests with new tests.
  - .11 If the testing equipment malfunction, improper testing procedures, or calculations were on the part of the Departmental Representative, the Contractor shall be reimbursed \$50 per location for obtaining cores.
- .5 Acceptance Sampling and Testing Procedures
- .1 Density, Asphalt Content and Gradation
    - .1 Pavement sampling will be done using stratified random sampling procedures. A minimum of five tests per Lot will be selected as follows:
      - .1 The Lot will be divided into five or more segments of approximately equal quantity.
      - .2 In each segment a test site will be located by using random numbers to determine the longitudinal distance from the end of the segment and the lateral distance from the edge of the segment. In no case will a lateral distance be less than 0.5 m from the shoulder or 0.3 m from any other edge of a mat except when

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matching mats, in which case the test site may be within 0.3 m of the joint.

- .2 For lifts of 20 mm or less, samples for asphalt content and gradation may be obtained by the Departmental Representative using the Sampling Mix Behind Paver method. If sufficient numbers of mix samples cannot be obtained in this manner, stratified random core samples shall be taken by the Contractor as determined by the Departmental Representative in order to perform the minimum five tests per Lot.
- .2 Smoothness
  - .1 The surface of the lots in the final lift of asphalt concrete pavement will be profiled by the Departmental Representative in accordance with ASTM E1274, Standard Test Method for Measuring Pavement Roughness Using a Profilograph, using a California Cox model profilograph. Other makes of profilograph machines may be used if they have been individually approved by the Departmental Representative. Profiles will be made approximately at the traffic wheel paths.
  - .2 Smoothness testing will also be undertaken on all passing, climbing, deceleration and acceleration lanes that are greater than 100 m in length, and on all interchange ramps. Tapers will not be subject to smoothness testing.
  - .3 Smoothness testing will extend completely across all transverse joints between existing pavement and HMA CP placed under this Contract. Penalty assessments and acceptance/rejection criteria will apply to all such bumps and dips identified.
  - .4 PrI assessment for smoothness will be determined starting at the location where all wheels of the profilograph are on HMA CP placed under this contract.
  - .5 Weather permitting, acceptance testing for smoothness will normally be completed within two weeks following the completion of all paving work subject to smoothness testing.
- .3 Asphalt Concrete Mix Sampling
  - .1 Sampling of the asphalt mixture for Marshall compaction comparison will be done by the Departmental Representative using the procedures identified AASHTO T40, Sampling Bituminous Materials.
- .4 Exclusions to Random Sampling
  - .1 Random sampling methods will not be applied when the Departmental Representative samples mix behind the paver on lifts of 20 mm or less; nor to small areas such as tapers, approaches, areas of handwork, gores; nor for asphalt mix used for isolated leveling and repair of failed areas.
- .6 Inspections for Pavement Segregation
  - .1 Inspection by the Contractor
    - .1 The Contractor shall perform a daily inspection of the paving

- operations on all lifts of pavement to identify any instances of pavement segregation.
- .2 If segregation is evident, the Contractor shall take immediate corrective action to his operations to prevent any further occurrence of segregation.
- .2 Inspections by the Departmental Representative during Construction
- .1 The Departmental Representative shall inspect the top lift of pavement. Typically, each pavement Lot would be inspected, as soon as possible after the Lot is placed. During the inspection(s) of the top lift, the Departmental Representative will identify and record any areas of moderate and severe segregation and any areas of center-of-paver streak. Areas requiring repair shall be marked. The Departmental Representative will provide the Contractor with a written assessment (location and severity) of the segregated areas as soon as possible following each inspection.
- .3 Inspection by the Departmental Representative Following Construction
- .1 The Departmental Representative shall conduct a second inspection of the top lift, normally two weeks after the completion of all paving work. During this inspection, the Departmental Representative will identify and record any areas of slight, moderate, and severe segregation and any areas of centre-of-paver streak which were not identified in the inspections during construction. The Departmental Representative will provide the Contractor with a written assessment (location and severity) of the segregated areas as soon as possible following this inspection.
- .7 Repairing Pavement Segregation
- .1 Pavement segregation identified during the inspection performed two weeks after the completion of paving operations will not require repair. However, this shall not relieve the Contractor from his responsibility to repair any obvious defects, deteriorated repairs, or failures which become evident within the warranty period.
- .2 Pavement segregation identified in the inspections performed during construction shall be repaired by the Contractor at his expense and in accordance with the following:
- .1 Moderate and severe segregation in the top lift of pavement and on entrances and intersections shall require repair.
- .3 Slight segregation on any lift of pavement will not require repair.
- .4 Moderate segregation on lower lifts will not require repair.
- .3 Only moderate and severely segregated centre-of-paver streak on the top lift of pavement will require repair.

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- .4 The following methods of repair are pre-approved:
    - .1 Moderate Segregation - The Contractor has the option of using a slurry patch or a hot mix patch.
    - .2 Severe Segregation - The Contractor has the option of removal and replacement or overlay.
  - .5 Any other methods of repair proposed by the Contractor will be subject to the approval of the Departmental Representative with the exception that the application of asphalt (by distributor, hand spraying, squeegeeing, etc.) shall not be permitted as a method of repair under any circumstances.
  - .6 Repairs for segregation using an overlay shall be for the entire pavement width.
  - .7 Repairs for segregation using removal and replacement shall be for the trail width as applicable, depending on the extent of the segregated area. The full depth of the asphalt lift shall be removed and replaced with new HMACP using an appropriate paver and cold milling equipment.
  - .8 All HMACP material used for overlay and removal and replacement repairs shall have a tack coat applied prior to placement and will be subject to the requirements of Section 1.5, End Product Acceptance or Rejection.
  - .9 The Departmental Representative will mark out the area of repair. The "marked area" shall extend a minimum of 0.5 metres beyond the segregated area. For centre-of-paver streak, the "marked area" shall extend a minimum of 100 mm laterally and 0.5 metres longitudinally beyond the streak.
  - .10 All repairs shall be regular in shape and finished using good workmanship practises to provide an appearance suitable to the Departmental Representative.
  - .11 Traffic shall be kept off all repairs for a sufficient period of time to ensure that tracking does not occur.
  - .12 All hot mix and other repairs for which compaction is normally required shall be properly compacted.
  - .13 In the event repairs cover existing roadway lines or markings, the Contractor shall reinstate the lines and markings at his expense and to the satisfaction of the Departmental Representative.
  - .14 Repairing pavement segregation will not affect the assessment of segregation payment adjustments.
  - .15 Repairs shall be completed during construction or shortly after construction, except when prevented by inclement weather or seasonal shutdown. In these cases, the Contractor shall complete the repairs prior to June 15 of the following year.
- .8 Appeal of Acceptance Test Results and Appeal Testing

- .1 Density, Asphalt Content, and Gradation
  - .1 The Contractor may appeal the results of acceptance testing of Density, Asphalt Content, or Gradation for any rejected or penalized Lot only once.
  - .2 Appeals will only be considered if cause can be shown. Quality control test results for Density that 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 cause for an appeal.
- .2 The following procedures will apply for an appeal:
  - .1 For Gradation and Asphalt Content appeals, the Contractor shall serve notice of appeal to the Departmental Representative, in writing, within 48 hours of receipt of the test results.

For all other appeals notice shall be served to the Departmental Representative, in writing, within 24 hours of receipt of the test results.
  - .2 The Departmental Representative will arrange and pay for an independent testing laboratory certified to operate in the Province of Alberta, 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 Departmental Representative will determine the number and location of the new tests for each segment in accordance with Section 2.3.4, Acceptance Sampling and Testing. The Contractor shall sample the pavement at such locations and provide the samples to the Departmental Representative.
  - .6 The new values, thus determined, in all cases, will be binding on the Contractor and the Departmental Representative.
- .3 Smoothness
  - .1 The Contractor may appeal acceptance test results of Smoothness of any rejected or penalized Sublot once.
  - .2 The appeal shall be in writing and submitted within 24 hours of receipt of the test results.
  - .3 Any attempt to improve Smoothness on the appealed lot after the Departmental Representative has tested the Lot for acceptance shall void the appeal and the original test results will apply.
  - .4 The appeal testing will be performed by an independent firm that is approved by the Departmental Representative to undertake the Smoothness testing.
  - .5 The new results will be binding on the Contractor and the Departmental Representative.
- .4 Segregation Rating

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- .1 The Contractor may appeal the segregation rating in any portion of the Work or the entire project for lane km(s) that are not in bonus.
  - .2 The following procedures will apply for an appeal:
    - .1 The Contractor must serve written notice of the appeal to the Departmental Representative within 7 days of receipt of a written segregation assessment. The written notice shall detail the locations and nature of the appeal.
    - .2 The Departmental Representative will determine a representative sample of the portion of the Work appealed, and will reassess this area with new assessors. Generally, this reassessment will be completed within 1 week of the Departmental Representative's receipt of the written notice of appeal.
    - .3 Based on the reassessment of the representative sample, the Departmental Representative will determine whether or not a reassessment of the entire appealed work is necessary.

### **Part 3 Execution**

- .1 All equipment shall be designed and operated to produce an end product HMAACP complying with all the requirements of this specification.
- .2 Mixing plants shall be operated in accordance with manufacturer's recommendations and shall be calibrated prior to commencing production of the specified mix. Contractor shall provide the Departmental Representative with a certificate of calibration which certifies that plant has been calibrated to produce uniform mixture in accordance with job mix formula.
- .3 When the HMAACP contains RAP, the mixing plant shall be capable of thoroughly separating and heating the RAP particles and blending the RAP with virgin aggregate and any required asphalt cement, to create a homogenous mix at the plant discharge. The plant shall also contain specialized mixing equipment that will prevent the RAP from coming into direct contact with the burner, thus minimizing the oxidation of the RAP and the production of fugitive emissions.
- .4 Storage facilities for asphalt cement shall be capable of heating material under effective and positive control and shall contain provision for measuring and sampling. Each tank shall contain only one asphalt cement type and grade.
- .5 Contractor shall supply all the equipment necessary to add liquid anti-stripping agent or lime when specified by the Departmental Representative. If liquid anti-stripping agent is specified it shall be added in-line with liquid asphalt cement when it is being pumped into the storage tank. If lime is specified as an anti-stripping agent the following shall apply:
  - .1 Hydrated lime shall be blended by pugmill into the cold aggregate feed.

- .2 Sufficient water shall be added at pugmill to ensure a minimum of 3% moisture content in the aggregate.

Addition of the liquid anti-stripping agent is considered incidental to the Work and no separate payment will be made.

**.6 Mix Production: Contractor to Provide**

- .1 Prior to mix production, a minimum of 10,000 tonnes of crushed aggregate for the HMA CP, when combined at design proportions, shall be stockpiled. Aggregate production shall continue in such a manner that a minimum quantity of 10,000 tonnes, or the quantity required to complete the work, whichever is less, is maintained in stockpile at all times.
  - .2 Aggregate and asphalt shall be combined to produce a uniform mixture of specified gradation at an asphalt content in accordance with the approved job mix formula and in which all particles of aggregate are uniformly coated.
  - .3 Unless otherwise specified, the maximum mixing temperature for all grades of asphalt cement shall be 155°C.
  - .4 Plant emissions shall not exceed the limits set by Alberta Environment.
  - .5 The asphalt plant must be equipped with pollution control devices in addition to, or in replacement of the standard cyclone dust collectors, to effectively eliminate the emission of dust and smoke pollutants into the atmosphere. The use of secondary dust collection systems which require the discharge of dust polluted water into natural drainage system will not be allowed. Regardless of the requirements stated in the above, the asphalt plant operation must comply with all environmental pollution control regulations applicable in the work area.
  - .6 A uniform mixture shall be produced in which all particles are thoroughly coated. Aggregate particles shall not be coated with residue from fuel combustion.
  - .7 The Contractor shall dispose of rejected asphalt concrete mix or removed asphalt concrete pavement in a manner acceptable to the Departmental Representative.
- .7 Pavers
- .1 Pavers shall be self propelled and operated with automatic electronic screed controls to maintain required levels, cross fall, and joint matching.
- .8 Rollers
- .1 Rollers shall have a compaction capability to match plant production rates in order to achieve the minimum specified compaction.
- .9 Preparation of Existing Surface
- .1 Failed areas in existing surfaces shall be repaired as directed by the Departmental Representative. Areas requiring repair will be identified by the Departmental Representative in consultation with Contractor. This work will be paid from the Prime Cost Sum.

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- .2 Before asphalt mix is placed, dirt and other objectionable material shall be removed from the surface to be paved, by brooming or other methods and is considered incidental to the Work and no separate payment will be made.
  - .3 Existing fillets and ramps at approaches to railway crossings and bridge structures, or adjacent to paved surfaces or other structures, shall be removed to depths shown on plans or in a manner acceptable to the Departmental Representative. Removed material shall be disposed of and exposed surfaces shall be prepared in a manner acceptable to the Departmental Representative.
  - .4 Where new surfacing materials are placed against an existing pavement structure, the joint shall be of a vertical butt type, well bonded, sealed, and finished to provide a continuous, smooth profile across the joint. To accomplish this, the existing pavement shall be cold-milled to expose a vertical surface, of a depth equal to the thickness of the lift, against which new pavement is to be placed. In longitudinal section the minimum slope of the milled area shall be 200:1. In plan the Contractor shall cut the joint in any of the following ways:
    - .1 The joint shall be cut at 45° to the centreline of the roadway across the full width of the mat; or
    - .2 The joint shall be cut at 45° to the roadway centreline across the travel lanes and contiguously at 90° to the roadway centreline elsewhere; or
    - .3 For median cross-over's and bridges the joint shall be cut parallel to the crossing.
    - .4 When the existing pavement has been removed in advance of the paving of the joint area, the Contractor shall construct a smooth taper at the joint area to a slope of at least 50:1. The taper may be placed on tar paper and shall be removed when paving is resumed. The traverse joint shall be straight and have a vertical face when the taper is removed.
    - .5 Contact edges of existing mats and contact faces of curbs, gutters, manholes, sidewalks and bridge structures shall be coated with a thin film of liquid asphalt material before placing the asphalt mix.
    - .6 Tack coat or a prime coat in accordance with Section 32 12 14, Asphalt Prime and Section 32 12 15, Asphalt Tack Coat.
    - .7 The tack or prime coat shall be allowed to cure prior to placing asphalt concrete mix.
    - .8 Areas that require preliminary levelling will be identified by the Departmental Representative. Generally, areas that show depressions, rutting or other deformations to a depth of 15 mm or greater will be designated by the Departmental Representative for preliminary levelling and all the following shall apply:
      - .1 material for preliminary levelling shall be the same designation and class as specified for the subsequent lift of HMA CP.



- .2 asphalt concrete mix for preliminary levelling shall be spread by means of a motor grader or other methods approved by the Departmental Representative.
- .3 only pneumatic tired rollers will be allowed for compaction, and a minimum density of 91% of the Marshall density, as determined by the Departmental Representative, is required.
- .4 preliminary levelling is intended to be a separate operation and shall not be done as part of the construction of the subsequent lift of HMA CP.
- .5 The preliminary levelling course with a final lift shall be considered as a single lift when Smoothness is assessed in Table No. 4.
- .6 For the purposes of determining the unit price adjustments, preliminary levelling is not considered a lift.

**.10 Transportation and Delivery of Mixtures**

- .1 Truck boxes shall be clean, free from accumulations of asphalt concrete mix and foreign material.
- .2 Excess truck box lubricants such as light oil, detergent, or lime solutions shall not be allowed to contaminate the asphalt concrete mix, and shall be disposed of in an environmentally acceptable manner. Petroleum based truck box lubricants shall not be used.
- .3 During transport, the mix shall be completely covered to protect it from precipitation and excessive heat loss by securely fastened waterproofed tarpaulins, unless otherwise approved by the Departmental Representative.
- .4 No loads shall be sent out so late in the day as to prevent completion of the spreading and compaction of the mixture during daylight, unless artificial light satisfactory to the Departmental Representative is provided.

**.11 Placing the Asphalt Concrete Mix**

- .1 Asphalt concrete mix shall not be placed when the air temperature is below 4°C, or when the weather is rainy.
- .2 Asphalt concrete mix shall be placed only on clean, dry, and unfrozen surfaces.
- .3 Unless otherwise shown on the plans, the asphalt concrete mix shall be placed in the following lift thicknesses:
  - .1 in a single lift when the design compacted total thickness is 70 mm or less.
- .4 If, during construction, it is found that the spreading and finishing equipment in operation leaves tracks or indented areas that are not satisfactorily corrected by the subsequent operations, or if it produces other permanent blemishes, the use of such equipment shall be discontinued and other satisfactory spreading and finishing equipment shall be provided by the Contractor.

- .5 Longitudinal joints shall not be permitted in any lane on the final lift of asphalt concrete.
- .6 Longitudinal joints shall be offset a minimum of 150 mm from one lift to the next.
- .7 Longitudinal and transverse joints shall be vertical butt type, well bonded and sealed, and finished to provide a continuous, smooth profile across the joints. Surplus material will be disposed off in a manner acceptable to the Departmental Representative.
- .8 If required by the Departmental Representative the contact edge of any mat placed by the Contractor shall be coated with a thin film of liquid Tack Coat before placing the adjacent mat and is considered incidental to the Work and no separate payment will be made.
- .9 When paving is discontinued in any lane or in any lift, the mat shall be tapered to a slope of 10 horizontal to 1 vertical. The taper may be placed on tar paper and shall be removed when paving is resumed. The transverse joint shall be straight and have a vertical face when the taper is removed.
- .10 Transverse construction joints from one lift to the next shall be separated by at least 2 metres.
- .11 Where the construction of a final lift of pavement next to a concrete curb section or curb and gutter section will be delayed, the Contractor shall construct a temporary asphalt concrete mix fillet next to the concrete section in accordance with the plans or as directed by the Departmental Representative. These fillets shall be removed when paving is resumed.
- .12 Road intersections and entrances shall be paved in accordance with the plans or as directed by the Departmental Representative. Unless otherwise permitted by the Departmental Representative, the asphalt mix shall be spread on intersections by means of a paver as paving of the main lanes passes by.
- .13 Contact faces of curbs, gutters, manholes, and sidewalks shall be coated with asphalt Tack Coat using a hand applicator before placing the asphalt mix and is considered incidental to the Work with no separate payment being made.
- .14 All longitudinal joints shall be straight and uniform with no lateral waviness. Any mat contact that is not straight or uniform, as determined by the Departmental Representative, shall be trimmed by saw-cutting or using some other method acceptable to the Departmental Representative prior to placing the adjacent mat. The material removed shall be disposed of to the satisfaction of the Departmental Representative and is considered incidental to the Work and will not be paid for separately.
- .15 Any mat with a contact edge that has deteriorated, cracked, or slumped due to improper compaction or vehicle traffic shall be trimmed by saw-cutting or some other method acceptable to the Departmental Representative prior to placing the adjacent mat. The length of the contact edge to be trimmed, removed, and disposed of will be as determined by the Departmental Representative and is considered incidental to the Work and will not be paid for separately.

**.12 Compacting the Mix**

- .1 All asphalt concrete mix, shall be thoroughly compacted, and after final rolling the finished surface of the mat shall be free from segregation, waves, hairline cracks, and other obvious defects.
- .2 After final rolling is complete, the Contractor shall ensure that the finished mat has cooled for a minimum of two hours before opening the section of traffic.

**Table No. 1 - Unit Price Adjustment for Density**

% OF MARSHALL DENSITY	UNIT PRICE ADJUSTMENT -DOLLARS PER TONNE				
	DESIGN LIFT THICKNESS				
Lot Mean	35 MM OR GREATER LOWER LIFTS	LESS THAN 35 MM AND GREATER THAN 20 MM LOWER LIFTS	20 MM LOWER LIFTS	35 MM OR GREATER TOP LIFT ONLY	LESS THAN 35 MM AND GREATER THAN 20 MM TOP LIFT ONLY
98.0 and higher	+ 0.50	+ 0.50	+ 0.50	+ 0.50	+ 0.50
97.9	+ 0.45	+ 0.45	+ 0.45	+ 0.45	+ 0.45
97.8	+ 0.40	+ 0.40	+ 0.40	+ 0.40	+ 0.40
97.7	+ 0.35	+ 0.35	+ 0.35	+ 0.35	+ 0.35
97.6	+ 0.30	+ 0.30	+ 0.30	+ 0.30	+ 0.30
97.5	+ 0.25	+ 0.25	+ 0.25	+ 0.25	+ 0.25
97.4	+ 0.20	+ 0.20	+ 0.20	+ 0.20	+ 0.20
97.3	+ 0.15	+ 0.15	+ 0.15	+ 0.15	+ 0.15
97.2	+ 0.10	+ 0.10	+ 0.10	+ 0.10	+ 0.10
97.1	+ 0.05	+ 0.05	+ 0.05	+ 0.05	+ 0.05
97.0	0.00	0.00	0.00	0.00	0.00
96.9	-0.10	0.00	0.00	-0.10	0.00
96.8	-0.20	0.00	0.00	-0.20	0.00
96.7	-0.30	0.00	0.00	-0.30	0.00
96.6	-0.40	0.00	0.00	-0.40	0.00
96.5	-0.50	0.00	0.00	-0.50	0.00
96.4	-0.60	0.00	0.00	-0.60	0.00
96.3	-0.70	0.00	0.00	-0.70	0.00
96.2	-0.80	0.00	0.00	-0.80	0.00
96.1	-0.90	0.00	0.00	-0.90	0.00
96.0	-1.00	0.00	0.00	-1.00	0.00
95.9	-1.10	0.00	0.00	-1.10	-0.10
95.8	-1.20	0.00	0.00	-1.20	-0.20
95.7	-1.30	0.00	0.00	-1.30	-0.30
95.6	-1.40	0.00	0.00	-1.40	-0.40
95.5	-1.50	0.00	0.00	-1.50	-0.50
95.4	-1.60	0.00	0.00	-1.60	-0.60
95.3	-1.70	0.00	0.00	-1.70	-0.70
95.2	-1.80	0.00	0.00	-1.80	-0.80

% OF MARSHALL DENSITY	UNIT PRICE ADJUSTMENT -DOLLARS PER TONNE				
	DESIGN LIFT THICKNESS				
Lot Mean	35 MM OR GREATER LOWER LIFTS	LESS THAN 35 MM AND GREATER THAN 20 MM LOWER LIFTS	20 MM LOWER LIFTS	35 MM OR GREATER TOP LIFT ONLY	LESS THAN 35 MM AND GREATER THAN 20 MM TOP LIFT ONLY
95.1	-1.90	0.00	0.00	-1.90	-0.90
95.0	-2.00	0.00	0.00	-2.00	-1.00
94.9	-2.20	0.00	0.00	-2.20	-1.10
94.8	-2.40	0.00	0.00	-2.40	-1.20
94.7	-2.60	0.00	0.00	-2.60	-1.30
94.6	-2.80	0.00	0.00	-2.80	-1.40
94.5	-3.00	0.00	0.00	-3.00	-1.50
94.4	-3.20	0.00	0.00	-3.20	-1.60
94.3	-3.40	0.00	0.00	-3.40	-1.70
94.2	-3.60	0.00	0.00	-3.60	-1.80
94.1	-3.80	0.00	0.00	-3.80	-1.90
94.0	-4.00	0.00	0.00	-4.00	-2.00
93.9	50% OF UNIT PRICE	-0.10	0.00	OVERLAY OR RM. &RP.	-2.20
93.8	50% OF UNIT PRICE	-0.20	0.00	OVERLAY OR RM. &RP.	-2.40
93.7	50% OF UNIT PRICE	-0.30	0.00	OVERLAY OR RM. &RP.	-2.60
93.6	50% OF UNIT PRICE	-0.40	0.00	OVERLAY OR RM. &RP.	-2.80
93.5	50% OF UNIT PRICE	-0.50	0.00	OVERLAY OR RM. &RP.	-3.00
93.4	50% OF UNIT PRICE	-0.60	0.00	OVERLAY OR RM. &RP.	-3.20
93.3	50% OF UNIT PRICE	-0.70	0.00	OVERLAY OR RM. &RP.	-3.40
93.2	50% OF UNIT PRICE	-0.80	0.00	OVERLAY OR RM. &RP.	-3.60
93.1	50% OF UNIT PRICE	-0.90	0.00	OVERLAY OR RM. &RP.	-3.80
93.0	50% OF UNIT PRICE	-1.00	0.00	OVERLAY OR RM. &RP.	-4.00
92.9	50% OF UNIT PRICE	-1.10	-0.10	OVERLAY OR RM. &RP.	-4.20
92.8	50% OF UNIT PRICE	-1.20	-0.20	OVERLAY OR RM. &RP.	-4.40
92.7	50% OF UNIT PRICE	-1.30	-0.30	OVERLAY OR RM. &RP.	-4.60
92.6	50% OF UNIT PRICE	-1.40	-0.40	OVERLAY OR RM. &RP.	-4.80
92.5	50% OF UNIT PRICE	-1.50	-0.50	OVERLAY OR RM. &RP.	-5.00
92.4	50% OF UNIT PRICE	-1.60	-0.60	OVERLAY OR RM. &RP.	-5.20
92.3	50% OF UNIT PRICE	-1.70	-0.70	OVERLAY OR RM. &RP.	-5.40
92.2	50% OF UNIT PRICE	-1.80	-0.80	OVERLAY OR RM. &RP.	-5.60
92.1	50% OF UNIT PRICE	-1.90	-0.90	OVERLAY OR RM. &RP.	-5.80
92.0	50% OF UNIT PRICE	-2.00	-1.00	OVERLAY OR RM.	-6.00

% OF MARSHALL DENSITY	UNIT PRICE ADJUSTMENT -DOLLARS PER TONNE				
	DESIGN LIFT THICKNESS				
Lot Mean	35 MM OR GREATER LOWER LIFTS	LESS THAN 35 MM AND GREATER THAN 20 MM LOWER LIFTS	20 MM LOWER LIFTS	35 MM OR GREATER TOP LIFT ONLY	LESS THAN 35 MM AND GREATER THAN 20 MM TOP LIFT ONLY
				&RP.	
91.9	50% OF UNIT PRICE	-2.20	-1.10	REMOVE & REPLACE	-6.20
91.8	50% OF UNIT PRICE	-2.40	-1.20	REMOVE & REPLACE	-6.40
91.7	50% OF UNIT PRICE	-2.60	-1.30	REMOVE & REPLACE	-6.60
91.6	50% OF UNIT PRICE	-2.80	-1.40	REMOVE & REPLACE	-6.80
91.5	50% OF UNIT PRICE	-3.00	-1.50	REMOVE & REPLACE	-7.00
91.4	50% OF UNIT PRICE	-3.20	-1.60	REMOVE & REPLACE	-7.20
91.3	50% OF UNIT PRICE	-3.40	-1.70	REMOVE & REPLACE	-7.40
91.2	50% OF UNIT PRICE	-3.60	-1.80	REMOVE & REPLACE	-7.60
91.1	50% OF UNIT PRICE	-3.80	-1.90	REMOVE & REPLACE	-7.80
91.0	50% OF UNIT PRICE	-4.00	-2.00	REMOVE & REPLACE	-8.00
90.9	REMOVE & REPLACE	50% OF UNIT PRICE	-2.20	REMOVE & REPLACE	50% OF UNIT PRICE
90.8	REMOVE & REPLACE	50% OF UNIT PRICE	-2.40	REMOVE & REPLACE	50% OF UNIT PRICE
90.7	REMOVE & REPLACE	50% OF UNIT PRICE	-2.60	REMOVE & REPLACE	50% OF UNIT PRICE
90.6	REMOVE & REPLACE	50% OF UNIT PRICE	-2.80	REMOVE & REPLACE	50% OF UNIT PRICE
90.5	REMOVE & REPLACE	50% OF UNIT PRICE	-3.00	REMOVE & REPLACE	50% OF UNIT PRICE
90.4	REMOVE & REPLACE	50% OF UNIT PRICE	-3.20	REMOVE & REPLACE	50% OF UNIT PRICE
90.3	REMOVE & REPLACE	50% OF UNIT PRICE	-3.40	REMOVE & REPLACE	50% OF UNIT PRICE
90.2	REMOVE & REPLACE	50% OF UNIT PRICE	-3.60	REMOVE & REPLACE	50% OF UNIT PRICE
90.1	REMOVE & REPLACE	50% OF UNIT PRICE	-3.80	REMOVE & REPLACE	50% OF UNIT PRICE
90.0	REMOVE & REPLACE	50% OF UNIT PRICE	-4.00	REMOVE & REPLACE	50% OF UNIT PRICE
89.9	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR R. & R.
89.8	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.7	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.6	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.5	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.4	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.3	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.2	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.1	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
89.0	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.9	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.

% OF MARSHALL DENSITY	UNIT PRICE ADJUSTMENT -DOLLARS PER TONNE				
	DESIGN LIFT THICKNESS				
Lot Mean	35 MM OR GREATER LOWER LIFTS	LESS THAN 35 MM AND GREATER THAN 20 MM LOWER LIFTS	20 MM LOWER LIFTS	35 MM OR GREATER TOP LIFT ONLY	LESS THAN 35 MM AND GREATER THAN 20 MM TOP LIFT ONLY
88.8	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.7	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.6	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.5	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.4	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.3	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.2	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.1	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
88.0	REMOVE & REPLACE	REMOVE & REPLACE	50% OF UNIT PRICE	REMOVE & REPLACE	OVERLAY OR RM. &RP.
87.9 and lower	REMOVE & REPLACE	REMOVE & REPLACE	REMOVE & REPLACE	REMOVE & REPLACE	OVERLAY OR RM. &RP.

- Notes: 1 - Single Lifts Only are considered as a Top Lift;  
2 - Preliminary Levelling is not considered as a Lift.  
3 - Rm. = Remove, Rp. = Replace

**Table No. 2 - Unit Price Adjustment for Actual Asphalt Content**

Deviation of Actual Asphalt Content from Approved Asphalt Content	Unit Price Adjustment for Asphalt Content (PAa) \$ per tonne			
	Top Lift		Lower Lift	
	Below	Above	Below	Above
From 0 to 0.30	0.00	0.00	0.00	0.00
From 0.31 to 0.35	-1.10	-0.90	-1.10	-0.90
From 0.36 to 0.40	-2.20	-1.80	-2.20	-1.80
From 0.41 to 0.45	-3.30	-2.70	-3.30	-2.70
From 0.46 to 0.50	-4.40	-3.60	-4.40	-3.60
From 0.51 to 0.55			-5.50	-4.50
From 0.56 to 0.60			-6.60	-5.40
From 0.61 to 0.65			-7.70	-6.30

Notes:

- For top lift deviations of more than 0.50% the Contractor shall either remove and replace or overlay the previous placed mix, as directed by the Departmental Representative.

2. For lower lift deviations of more than 0.65%, the Departmental Representative with determine whether removal and replacement is necessary. For material that is allowed to stay in place, payment will be at 50% of the unit price bid.

**Table No. 3 - Maximum Deviation for the Lot Mean from the Gradation Limits Specified in Table No. 10**

Sieve Size, $\mu\text{m}$	Lot Mean
16,000, 12,500, 10,000	+/- 2%
5,000, 1,250, 630, 315	+/- 1%
160, 80	+/- 0.5%
80 Deviation = <1.0%	1.0 for each 1% Deviation
80 Deviation >1.0%	2.0 for each additional 0.1% Deviation

**Table No. 10 - Specifications for Aggregates**

Designation 1			
Percent Passing Metric Sieve	Class Sieve Size, $\mu\text{m}$		16
	20,000		
	16,000		100
	12,500		80 - 92
	10,000		70 - 84
	5,000		50 - 65
	1,250		26 - 45
	630		18 - 38
	315		12 - 30
	160		8 - 20
	80		4 - 10
% Fracture by Weight			see Table No. 11
Plasticity Index (PI)			NP
L.A. Abrasion Loss Percent Max.			40

**Table No. 11 - Asphalt Concrete Mix Characteristics**

% MF, - 5000 (Min) (Note 1)	% Fractures +5000 (2 Faces) (min)	Asphalt Cement Grade	Marshall Stability N (min)	No. of Blows	Air Voids	VMA % (min) by % Air Voids 3.5, 4.0	Voids filled with Asphalt %	Flow (mm)	Retained Stability % (min)
75	98 (one face) 90	150-200A	12,000	75	see Note 2	13.0, 13.5	65 to 75	2.0 to 3.5	70

- Note 1: The percentage of Manufactured Fines in the -5,000 micron sieve portion of the combined aggregate.
- Note 2: The design air voids will be chosen as the lowest value, within the range of 3.5 to 4.0% inclusive, such that all other mix design criteria are met.
- Note 3: The minimum Theoretical Film Thickness requirement shall be as follows:  
 3.9 and 4.0 % = 6.0 µm  
 3.7 and 3.8% = 6.1 µm  
 3.5 and 3.6% = 6.2 µm
- Note 4: To meet the current requirements of AASHTO M320, Performance-Graded Asphalt Binder

**Table No. 12 - Quality Control Testing Requirements**

Test	Minimum Frequency
AGGREGATE PRODUCTION	(Note 2)
ASPHALT MIX PLANT 1. Calibration 2. Inspection	Once per project or as required (note 1)
SAMPLES 1. Asphalt Cement 2. Tack, Prime and Fog Materials 3. Cold Feed Aggregate 4. Mix 5. QA Cores- Stratified Random Test Sites Chosen By the Departmental Representative. i) QA Cores for Pavement Density ii) QA Cores for Asphalt Content and Gradation	(note 1) (note 1) (note 1) (note 1) (note 1) (note 1) One segment for each lot One per segment for selected Lots as directed by Departmental Representative
TESTS WITH SPECIFIED MINIMUM FREQUENCIES 1. Mix Asphalt Content 2. Correction Factors 3. Mix Moisture Content 4. Aggregate Sieve Analysis	(note 2) As Required (note 2) (note 2)
TESTS WITH SPECIFIED MINIMUM FREQUENCIES 1. Field Formed Marshall Briguettes 2. Density Immersion Method, Saturated Surface Dry 3. Void Calculations, Cores or Formed Specimens 4. Temperatures 5. Percent Compaction, Cores or Nuclear Density	(note 1) (note 1) (note 1) (note 1) (note 1) (note 1)
<p>Note 1: Minimum frequency not specified.</p> <p>Note 2: When a Lot has eight hours of plant production or more, a minimum of four plant checks plus four asphalt contents and four sieve analysis of the combined aggregate are required. When a Lot has less than eight hours of plant production, these tests shall be performed once for every two full hours of plant production.</p>	



**Table No. 13 - Sieve Designations**

<b>Sieves in Accordance with: AASHTO Designation: M92 ASTM Designation: E11</b>	<b>U.S. Standard Series Opening &amp; Designation</b>	<b>Metric Sieves in accordance with: CGSB Spec.8-GP-2M µm</b>
125.0 mm	5"	125 000
75.0 mm	3"	80 000
63.0 mm	2-1/2"	63 000
50.0 mm	2"	50 000
37.5 mm	1-1/2"	40 000
25.0 mm	1"	25 000
19.0 mm	3/4"	20 000
16.0 mm	5/8"	16 000
12.5 mm	1/2"	12 500
9.5 mm	3/8"	10 000
4.75 mm	#4	5 000
2.36 mm	#8	2 500
2.00 mm	#10	2 000
1.70 mm	#12	1 600
1.18 mm	#16	1 250
0.850 mm	#20	800
0.600 mm	#30	630
0.425 mm	#40	400
0.300 mm	#50	315
0.150 mm	#100	160
0.075 mm	#200	80
0.045 mm	#325	45

**END OF SECTION**

**1 GENERAL**

**1.01 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 31 - Special Procedures for Traffic Control and Construction Detours.
- .3 Section 01 35 43 - Environmental Procedures

**1.02 DESCRIPTION OF WORK**

- .1 The work covered by the specification shall consist of mechanically and/or hydraulically seeding and fertilizing areas within the limits of construction or as designated by the Departmental Representative.

**1.03 MEASUREMENT FOR PAYMENT**

- .1 Mechanical, hydraulic and/or Hand Seeding will be measured by each square meter acceptably installed, complete with fertilizer, and resulting in full grass growth, 75% germination and cover, within the dimensions indicated on the Drawings or as approved by the Departmental Representative. Payment for seeding shall be full compensation for all labour, equipment, materials and incidentals required to place materials in accordance with the requirements of the Specifications, Drawings and direction of the Departmental Representative. Payment shall be paid under "Unit Price Item - Seeding".
- .2 Areas of blending into existing landscape will not be measured for payment.
- .3 Maintenance is incidental and will not be paid for separately.

**1.04 SUBMITTALS**

- .1 Product Data
  - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Provide product data for:
    - .1 Seed
    - .2 Mulch
    - .3 Tackifier/Soil Stabilizer
    - .4 Fertilizer
  - .3 Submit in writing to Departmental Representative 14 days prior to commencing work:
    - .1 lume capacity of hydraulic seeder, in litres
    - .2 Amount of materia to be used per tank based on volume.
    - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

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## **1.05 QUALITY ASSURANCE**

- .1 Test reports: certified test reports showing compliance with specified performance characteristics and physical properties.

## **1.06 MATERIAL DELIVERY, HANDLING AND STORAGE**

- .1 Use all means necessary to protect all materials before, during and after installation. Provide adequate protection to materials which may deteriorate if exposed to weather.
- .2 Fertilizer shall be packaged in waterproof bags labelled clearly, indicating net mass, analysis and manufacturer. Store on pallets and protect from weather.
- .3 Seed to be stored in dry waterproof place and shall be protected from damage by heat, rodents and other causes. Deliver and store grass seed in original packages with label indicating:
  - .1 analysis of seed mixture
  - .2 percentage of pure seed by weight
  - .3 year of production
  - .4 net mass
  - .5 date tagged and location.

## **2 PRODUCTS**

### **2.01 SEED**

- .1 Seed shall be Certified Canada No. 1 Grade quality seed varieties, in accordance with the Canadian Seeds Act and Regulations, and having a minimum purity of 97% and germination of 75%. Seed shall be free of impurities and disease.
- .2 Seed mix for all applications to be the following, by weight:
  - .1 15% Adanac Slender Wheatgrass
  - .2 15% Fringed Bromegrass 'Nutraccoat'
  - .3 15% Nortran Tufted Hairgrass 'Nutraccoat'
  - .4 15% Fowl Bluegrass 'Nutraccoat'
  - .5 10% ARC Plateau Rocky Mountain Fescue
  - .6 5% ARC Mountain Junegrass
  - .7 10% ARC Glacier Alpine Bluegrass
  - .8 10% ARC Sentinel Spike Trisetum 'Nutraccoat'
  - .9 5% Citation III Perennial Ryegrass
- .3 Seeding rate to be 25kg/ha for mechanical seeding and 50 kg/ha for hydraulic seeding.
- .4 Seed mix shall be free of Scentless Chamomile, Downy Bromw and Canada Thistle.

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## **2.02 FERTILIZER**

- .1 Fertilizer 1 shall be 39-0-0 100% slow release polymer coated sulphur coated urea. This fertilizer shall be applied at time of seeding at a rate of 125kg/ha.
- .2 Fertilizer 2 shall be Milorganite 6-2-0 or approved alternate. Milorganite is a fertilizer product manufactured from various microbes used to digest sewage sludge. This fertilizer shall be applied at the time of seeding at 500kg/ha. Supplier: Professional Gardner, Phone: 403 263 4200

## **2.03 WATER**

- .1 Water shall be free of impurities that would inhibit germination and growth.

## **2.04 SOIL STABILIZER/TACKIFIER**

- .1 Soil stabilizer/tackifier shall be a non toxic, colourless copolymer emulsion with no less than 52.6% solids. Available product is: Soil Master WR or approved alternate. Supplier: Target Products Phone: 1-800-575-7700.

## **2.05 MULCH**

- .1 Wood fibre mulch shall be manufactured from virgin wood fibres and contain not less than 3% of an organic tackifier by volume. Cellulose type products are not acceptable. Acceptable product is: Eco Fibre Plus or approved alternate. Supplier: Professional Gardiner, Phone: 403-263-4200.

## **3 EXECUTION**

### **3.01 GENERAL SEEDING**

- .1 Contractor shall advise Departmental Representative prior to the start of seeding operations.
- .2 Contractor shall mechanically remove any weeds prior to seeding. Weed removal method to be approved by Departmental Representative prior to the commencement. This will be incidental to the Work.
- .3 Contractor shall ensure that equipment is steam cleaned, free of soil and seed from previous project to prevent site contamination.
- .4 Seeding shall be done upon completion of stripped soil/chip compost placement.
- .5 Contractor shall not perform work under adverse field conditions such as frozen soil, excessively wet or dry soil, or soil covered with snow or standing water.
- .6 Contractor shall hydraulic seed only during dry weather conditions with no rain forecasted for the next 24 hours and ensuring a seasonably dry seedbed to provide proper curing of the soil stabilizers/tackifier. Contractor shall

check weather conditions to ensure soil stabilizer has sufficient time to cure prior to a heavy rainfall.

- .7 Seeding shall be done to ensure catch satisfactory to the Departmental Representative's approval. In areas where seed fails to germinate for whatever reason, the Contractor shall re-cultivate and reseed until acceptable germination takes place.
- .8 Contractor shall carry out seeding in locations shown on Drawings, or as directed by Departmental Representative. Seeding shall be done as follows:
  - .1 Mechanical and Hand Seeding: 3:1 (H:V) slopes or flatter
  - .2 Hydraulic Seeding: Grades between 3:1 and 1.5:1 slopes.

### **3.02 MECHANICAL SEEDING**

- .1 The following application rates are the minimum required for mechanical seeding:

	Grass Seed	25
kg/hectare	Fertilizer 1: 30-0-0	125
kg/hectare	Fertilizer 2: Milorganite	500
kg/hectare		
- .2 Contractor shall apply fertilizer onto prepared seedbeds ensuring even coverage at specified rates.
- .3 The Contractor shall mechanically sow seed during calm weather using a drill seeder. Sow half of the required amount of seed in one direction and the remainder at right angles to the first application.
- .4 The Contractor shall clean all structures and natural features not designated to be seeded, to the satisfaction of the Departmental Representative.
- .5 The Contractor shall ensure that at all times during the seeding, that no vehicles are parked within the path of public travel and the Contractor shall provide warning devices as directed by the Departmental Representative to ensure safe operations.

### **3.03 HYDRAULIC SEEDING**

- .1 The following application rates are the minimum required for hydraulic seeding:

	Grass Seed:	50
kg/hectare	Fertilizer 1: 30-0-0	125
kg/hectare	Fertilizer 2: Milorganite	500
kg/hectare	Mulch	500
kg/hectare	Soil Stabilizer/tackifier	1300
L/hectare		

- 
- Soil Master WR  
Water 30,000 L
- (min)
- .2 The Contractor shall measure quantities of materials by weight, or weigh calibrated volume measurement, to the satisfaction of the Departmental Representative.
  - .3 The Contractor shall fill the tank half full with required water and add mulch while continuing to fill with water. Seed mix and fertilizer is to be added. All material is to be added into the hydraulic seeder under agitation. The Contractor shall pulverize mulch with tackifier and charge slowly into seeder.
  - .4 The Contractor shall charge soil stabilizer/tackifier into the seeder after all other material is well mixed in seeder. Contractor shall mix slowly to avoid foaming but thoroughly to complete slurry.
  - .5 The Contractor shall use hydraulic seeding equipment with a minimum slurry tank capacity of 4500 litres.
  - .6 The Contractor's equipment shall have an agitation system for slurry capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and mechanical method:
    - .1 Pumps shall be capable of maintaining a continuous non-fluctuating flow of solution.
    - .2 Equipment shall be capable of seeding up to 150 m distance from hydraulic seeder using hand operated hoses and appropriate nozzles.
  - .7 The Contractor shall apply slurry when wind velocities will not affect the application and cause the mixture to be blown.
  - .8 The Contractor shall apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed. Ensure good contact of slurry with soil with minimal air pockets.
  - .9 The Contractor shall use the correct nozzle(s) for application and use hoses to access difficult to reach surfaces and to control application.
  - .10 The Contractor shall ensure that the application is uniform and the surface is evenly covered. Contractor shall blend into retained landscape approximately 1 metre.
  - .11 The Contractor shall clean all structures, appurtenances and natural features not designated to be seeded of any overspray, to the satisfaction of the Departmental Representative.
  - .12 The contractor shall ensure that at all times during the seeding, that no vehicles are parked within the path of public travel and the Contractor shall provide warning devices as directed by the Departmental Representative to ensure safe operations.

### **3.04 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Establishment period is a minimum of four months of continuous growing

season. Growing season shall not be divided by winter.

- .2 The Contractor shall repair and reseed dead or bare spots, as directed in these specifications to Departmental Representative's satisfaction, to allow establishment of seed prior to acceptance. In case of erosion, the Contractor shall be compensated at the specified unit rates for reseeding.
- .3 For areas of poor seed germination, as determined by the Departmental Representative, the soil shall be scarified or re-cultivated as directed by the Departmental Representative, and the seeding and fertilizer undertaken as specified. This work is incidental to the contract.
- .4 Mechanical weed control shall be undertaken as determined by the Departmental Representative. Hand pulling of weeds may be required. This work is incidental to the contract.

### **3.05 CONSTRUCTION COMPLETION ACCEPTANCE**

- .1 Seeded areas will be accepted by the Departmental Representative provided that all areas are uniformly established and turf is not eroded or rutted and relatively free of weeds. Seeded areas to be growing for a minimum of four continuous months prior to construction completion acceptance inspection.
- .2 Areas seeded in the fall will be accepted in the following spring, a minimum of four months after the growing season, provided acceptance conditions are fulfilled.

### **3.06 MAINTENANCE DURING WARRANTY PERIOD**

- .1 Maintenance shall occur for one full year from Construction Completion Acceptance. The estimated period of maintenance within one calendar year shall be from approximately April 1 to October 31. The Contractor will be required to employ all of the necessary measures to establish and maintain all seeding in an acceptable, vigorous and healthy growing condition.
- .2 The Contractor shall repair and reseed dead or bare spots, as directed in these specifications to Departmental Representative's satisfaction, to allow establishment of seeds prior to acceptance. In case of erosion, the Contractor shall be compensated at the specified unit rates for reseeding.
- .3 For areas of poor seed germination or as determined by the Departmental Representative, the soil shall be scarified or re-cultivated as directed by the Departmental Representative, and seeding and fertilization undertaken as specified. This work is incidental to the Contract.
- .4 Weed control shall be undertaken as determined by the Departmental Representative. Hand pulling of weeds may be required. This work is incidental to the contract.

### **3.07 CLEANING**

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

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BANFF LEGACY TRAIL FLOOD SEEDING  
REPAIRS  
BANFF NATIONAL PARK  
PROJ NO: BNP13-04-050

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END OF SECTION



**1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittals
- .2 Section 01 35 43 - Environmental Procedures
- .3 Section 31 24 14 - Trail Excavation, Embankment and Compaction
- .4 Section 31 37 10 - Riprap

**1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION**

- .1 The original 800 mm culverts that were in the crossing at the Cascade Junction have been washed away from the crossing during the June floods and may be salvageable for the works defined in the Contract. The Contractor is to recover and evaluate the condition of the culvert to assess whether or not they are reusable to incorporate into the Works.

**1.03 MEASUREMENT AND PAYMENT**

- .1 Measure supply and installation of pipe culvert including excavation and backfill in metres in place for the 800 mm culvert placed.
- .2 Payment will be made under the "Unit Price Table Item - 800 mm Culvert" in metres of culvert measured and installed and will include all costs for labour, equipment, and materials to supply and install.
- .3 If the existing culvert or portions thereof is reused for construction of the works a credit is to be applied for the supply of culvert to this Contract. The Contractor and the Departmental Representative shall assess the salvaged culvert and mutually decide on what can be reused and what will be installed new.

**1.04 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .2 CSA International
  - .1 CAN/CSA G401-07, Corrugated Steel Pipe Products.

**1.05 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 Submittal Procedures.
- .2 Certification: to be marked on pipe.
- .3 Test and Evaluation Reports:
  - .1 Submit manufacturer's test data and certification at least 4 weeks

prior to beginning Work.

### **1.06 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Store and protect pipes from damage.
  - .3 Replace defective or damaged materials with new.

### **1.07 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Section 01 35 43 - Environmental Procedures.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by the Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

## **2 PRODUCTS**

### **2.01 CORRUGATED STEEL PIPE**

- .1 Corrugated steel pipe: to CAN/CSA-G401.
- .2 Culverts to be annular or spiral with annular ends. Coupling bands to be two piece annular bolted with minimum width of nine corrugations.
- .3 Minimum wall thickness to be 2.0 mm.
- .4 Corrugations to be 68 mm x 13 mm.
- .5 For all exposed culvert ends, 2:1 mitred end sections will be required.

### **2.02 RIPRAP**

- .1 Riprap shall be placed in accordance with Section 31 37 10 - Riprap. The type of Riprap shall be hand placed riprap.

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### **2.03 CUT ENDS**

- .1 All exposed ends of CSP to have sloped end sections.
- .2 All cut edges shall be made smooth by grinding so that all burrs are removed. Any damaged galvanizing shall be restored by zinc metallizing in accordance with CSA G401.
- .3 Where an existing culvert is extended, up to 3 m of the existing culvert end shall be removed as directed by the Departmental Representative.

### **2.04 GRANULAR BEDDING AND BACKFILL**

- .1 Granular bedding and backfill material to be supplied by the Contractor and shall

## **3 EXECUTION**

### **3.01 TRENCHING**

- .1 Do trenching Work in accordance with Section 31 24 14 - Trail Excavating, Trenching and Backfilling.
- .2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe.

### **3.02 BEDDING**

- .1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.
- .2 Place 200 mm minimum thickness of approved granular material on bottom of excavation and compact to 95% minimum of maximum density to ASTM D 698.
- .3 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding and to camber as indicated or as directed by Departmental Representative, free from sags or high points.
- .4 Place bedding in unfrozen condition.

### **3.03 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 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

**3.04 JOINTS: CORRUGATED STEEL CULVERTS**

- .1 Corrugated steel pipe:
- .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 to spelter coating by applying two coats of zinc rich paint approved by the CSP supplier. Allow each coat to dry before placing second coat, bedding or backfill.

**3.05 BACKFILLING**

- .1 Backfill around and over culverts as indicated or as directed by Departmental Representative.
- .2 Place granular backfill material in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
- .3 Compact each layer to 98% maximum density to ASTM D 698 taking special care to obtain required density under haunches.
- .4 Protect installed culvert with minimum 900 mm cover of compacted fill before heavy equipment is permitted to cross.
  - .1 During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.
- .5 Place backfill in unfrozen condition.
- .6 Place riprap.

**3.06 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**