



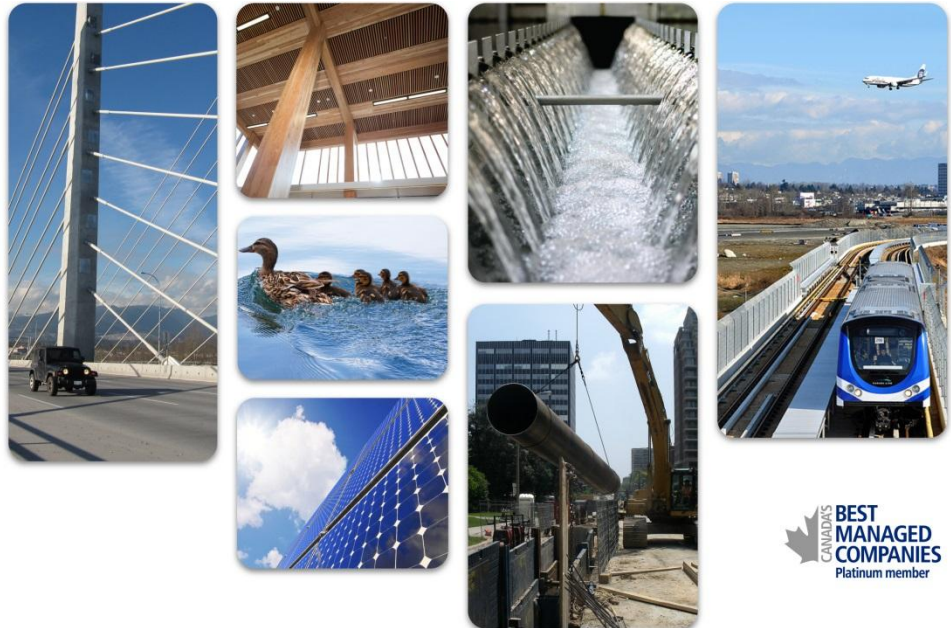
**Associated  
Engineering**

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## **CONTRACT DOCUMENTS**

### **Jasper National Park of Canada**

#### **Mt. Edith Cavell Rehabilitation Contract 2**



**CANADA'S  
BEST  
MANAGED  
COMPANIES**  
Platinum member

**March 2017**


**CONTRACT SPECIFICATIONS  
FOR THE  
MT. EDITH CAVELL REHABILITATION- CONTRACT 2  
JASPER NATIONAL PARK OF CANADA  
PROJECT NO. 719  
MARCH 2017**



Arsenij Podolski, P.Eng.  
Project Engineer



Chad Maki, P.Eng.  
Project Manager

<b>ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF</b>	
Signature:	
Date:	<u>March 17, 2017</u>
<b>APEGGA Permit to Practice P 3979</b>	

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**END OF DOCUMENT**

## **1 General**

### **1.1 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Specific work for this contract (base bid) shall be comprised of work associated with but not limited to what is predicted in drawings and specifications.
- .2 Tree clearing and topsoil stripping and stockpiling has been completed in 2016.
- .3 The civil work includes, but is not limited to, the following:
  - .1 Remove and dispose approx. 2300 m<sup>2</sup> of asphalt.
  - .2 Remove and dispose approx. 2000 m<sup>3</sup> of stockpiled topsoil.
  - .3 Import approx. 5600 m<sup>3</sup> of granular material.
  - .4 Approx. 3100 m<sup>3</sup> of common excavation, place and compact.
  - .5 Approx. 4700 m<sup>2</sup> of asphalt concrete paving.
  - .6 Approx. 4850 m<sup>2</sup> of granular base course.
  - .7 Approx. 9500 m<sup>2</sup> of sub-grade preparation.
  - .8 Supply and install approx. 210 m of CSP culvert.
  - .9 Supply and place approx. 330 m<sup>2</sup> of rip rap c/w geo fabric.
  - .10 Supply and install approx. 210 m of perforated sub-drain.
  - .11 Supply and install approx. 800 tree saplings.
  - .12 Install approx. 150 white bark pine saplings.
  - .13 Placement of approx. 4700 m<sup>2</sup> of topsoil.
  - .14 Supply and install approx. 1850 m of pavement markings.
  - .15 Supply and install approx. 28 signs.
  - .16 Supply and install approx. 70 m of asphalt trail.
  - .17 Repair approx. 750 m<sup>2</sup> of asphalt trail.
  - .18 Supply and install site furnishings.
  - .19 Supply and install 2 washroom structures.
  - .20 Supply and install approx. 35 m<sup>2</sup> of gabion retaining wall.
  - .21 See bid form for more details.
- .4 The work, unless specifically stated otherwise, shall include transportation, labour, material, tools, equipment, and all other incidentals required to complete the work. The intent is that the contractor provides a complete product.
- .5 Any minor item of the work not called for in the specifications or shown on the drawings but clearly required to meet the intent of design and normally provided for the proper operation of the work shall be provided as if specifically called for in the contract documents. No additional payment will be made for this incidental work.
- .6 The contractor shall supply all material for the work unless expressly stipulated otherwise in the contract documents.

## **1.2 CONTRACT METHOD**

- .1 Construct Work under unit price contract.

## **1.3 CONSTRUCTION DURATION**

- .1 Construction for the Access Road and Parking Lot may commence after the contract award in 2017. Access road and parking lot work shall be completed by October 31, 2017.
- .2 Trail work to be performed outside of the visitor season and during the following periods:
  - .1 Following the contract and prior to June 5, 2017;
  - .2 September 15 to October 31, 2017.
- .3 Carry over work may be completed between May 15 and October 31, 2018.

## **1.4 HOURS OF OPERATION**

- .1 Construction can be performed 7 day a week, Monday to Sunday, between the hours of 7:00 am to 7:00 pm, excluding the statutory holidays and dates identified in 1.4.2. Work cannot interrupt park business during this time.
- .2 No construction will be permitted during the following special events and civic holidays:
  - .1 Gran Fondo (June 10)
  - .2 Canada Day (July 1<sup>st</sup> to July 4<sup>th</sup>)
  - .3 Civic Holiday (August 5<sup>th</sup> to August 8<sup>th</sup>)
  - .4 Labour Day (September 5<sup>th</sup> to September 8<sup>th</sup>)
- .3 The contractor will responsible to halt all construction activities and secure the site during the above dates for visitors.

## **1.5 VISITORS ACCESS**

- .1 The park visitor season is between the first week of June to mid-September.
- .2 Visitor hours will be between 8:00 am and 8:00 pm.
- .3 Parks Canada will limit the visitor access to Mt. Edith Cavell Recreation Area by introducing visitor permits. 150 permits will be issued on a daily basis.
- .4 Maintain access to site for the visitors for the duration of the work. The operation of the existing facilities including existing access road, parking lot, sanitary facilities, trails and day-use area must be maintained for the duration of the contract unless otherwise specified by the Department Representative.
- .5 Allow Department Representatives, Parks Canada Personal and Geotechnical Testing/ Inspection Agency Representatives access to the construction site at all times.
- .6 2 weeks prior to construction start, erect 5 information signs to advise the public that a valid visitor permit will be required to gain access to the Edith Cavell Recreational

Area and Trails. The signs to be bilingual (English and French). Erect the signage at the following locations:

- .1 Intersection of Highway 16 and Highway 93;
- .2 Intersection of Highway 93A and Highway 93;
- .3 At the entrance of the Edith Cavell Road;
- .4 Wabasso Campground;
- .5 South intersection of Highway 93A and Highway 93;
- .7 The sign location will be confirmed by the Department Representative prior to sign installation.
- .8 Obtain permit to erect the informational signage. The permit will be available at the Jasper Administration Office.

## **1.6 TRAFFIC ACCOMMODATION STRATEGY**

- .1 Prepare and submit a Traffic Accommodation Strategy (TAS) for approval for the following location:
  - .1 Edith Cavell Road between Hwy 93 and Mt. Edith Cavell Recreational Site during haul activities.
  - .2 Mt. Edith Cavell Recreational Site.
- .2 Traffic Accommodation Strategy in accordance with Alberta Transportation Manual "Traffic Accommodation in Work Zones 2008, First Edition".
- .3 Fence of the entire construction area including laydown area with a minimum 1.8 m height steel construction fence.
- .4 Maintain the Traffic Control Devices on a daily basis.
- .5 Install Long Duration Project Signs:
  - .1 Sign Size and Type according to the Sign Schedule outline in the Traffic Accommodation in Work Zones 2008, First Edition.
  - .2 Sign height to Roadway: 1.5 m.
  - .3 Post to be anchored into the ground.
  - .4 If necessary to make specific signs more prominent, attach flags and /or flashers.
- .6 Perform regular maintenance of all haul routes during the construction. During haul activities clean the haul routes at the end of every haul day or as requested by the Department Representative. Failure to clean- up the haul routes in timely manner will result in the Parks Canada performing the work and all related costs will be subtracted from the final progress payment. Therefore, Contractor to monitor the haul routes throughout the hauling period.

## **1.7 BUSINESS LICENSE/PERMITS**

- .1 Obtain a Business License to operate within Jasper National Park.
- .2 All business and private vehicles are required to display a vehicle work permit.

- .3 Obtain a Special Activity Permit. No work can be performed without the permit.

## **1.8 WORK BY OTHERS**

- .1 Permit access to Parks Canada and Department Representative.
- .2 Maintain fire access/control.

## **1.9 CONTRACTOR USE OF PREMISES**

- .1 Accommodations are available in Jasper, Alberta. Contractor to obtain their own accommodation. Camping is not allowed on site premises.
- .2 A Parks Canada Work Camp is available in Jasper National Park. Use of the Work Camp by the Contractor is optional and subject to the Parks Canada use regulations and fees.
- .3 Limit use of premises for Work, for storage, and for access, to allow Owner occupancy.
- .4 Co-ordinate use of premises under direction of Department Representative.
- .5 Assume full responsibility for protection and safekeeping of construction site and products under this contract.
- .6 A Lay-down yard has been designated for the contractor's use. See construction drawings. Keep the yard tidy.
- .7 Parks Canada will plough snow on the Edith Cavell Road between Hwy 93 and Mt. Edith Cavell Recreational Site. The contractor will be responsible to clear snow from the entire construction site including lay-down yard.
- .8 Mobilization and Demobilization of equipment to be completed prior to the visitor season (before June 5, 2017/2018 and after September 15, 2017/2018). Delivery of materials to site need to be completed prior to visitor season or between the following hours during the visitor season to limit disturbance to visitors:
  - .1 6:00 am and 8:00 am;
  - .2 8:00 pm and 10:00 pm.
- .9 Prior to equipment delivery to site, the contractor shall ensure the equipment size and width can be accommodated by the Cavell Road. The Cavell Road is a paved is approximately 6 m wide (some areas have narrower pavement widths), with multiple switch backs with approximate 8.0 m radii (approximate pavement width at the switch back is 14 m).
- .10 At completion of operations restore disturbed by construction activities including laydown yard: equal to or better than that which existed before work started.
- .11 Contractor to follow all environmental regulations and mitigations measures identified in Section 01 35 43 Environmental Procedures.



## **1.10 CONTRACTOR'S USE OF WORK CAMP**

- .1 Contractor can reserve use of the individual Work Camp spaces, at a cost of \$29.40 plus GST per space. Award of spaces is on a first come first served basis, and this determination is made after award of the Contract.
- .2 Each Work Camp space can accommodate up to a Class A motor home plus vehicles as per terms of use.
- .3 The Work Camp is located at the intersection of Sleepy Hollow Road and Connaught Drive in Jasper, AB.
- .4 Coordinate use of Work Camp under direction of the Departmental Representative. Use of the Work Camp is permitted until the Contract Termination, or earlier as directed by Jasper National Park.
- .5 The Work Camp is not to be used for additional storage or work areas that may be needed for operations under this Contract. No storage or use of equipment, construction materials or machinery is allowed.
- .6 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 PCA Environmental Surveillance Officer or as directed by the Departmental Representative.
- .7 Use of the Work Camp must conform to the requirements contained in *J16-025 PCA Recreational Vehicle (RV) Work Camp – Sleepy Hollow Road*, Appendix 1, Terms and Conditions of Sleepy Hollow Work Camp – July 2016, as attached to these specifications.

## **1.11 CRITICAL ENVIRONMENTAL TIMING WINDOWS**

- .1 Following are the critical environmental timing windows which must be followed.
- .2 No construction work can be performed during these periods:
  - .1 November 1 to February 15 - Woodland Caribou Overwintering.
  - .2 March 1 to early May - Woodland Caribou at Mount Edith Cavell.
- .3 Construction can only be performed between May 15 and October 31.
- .4 No clearing work can be performed during this periods:
  - .1 April 20 to August 31 - Migratory Bird Protection Period.
- .5 Tree clearing and topsoil stripping and stockpiling has been completed in 2016.

## **1.12 OWNER FURNISHED ITEMS**

- .1 Contractor Responsibilities:
  - .1 Designate submittals and delivery date for each product in progress schedule.
  - .2 Review shop drawings, product data, samples, and other submittals. Submit to Department Representative notification of observed discrepancies or problems anticipated due to non conformance with Contract Documents.
  - .3 Receive and unload products at site.

- .4 Inspect deliveries jointly with Owner; record shortages, and damaged or defective items.
- .5 Handle products at site, including uncrating and storage.
- .6 Protect products from damage, and from exposure to elements.
- .7 Assemble, install, connect, adjust, and finish products.
- .8 Provide installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

### **1.13 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy of 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 WHMIS Documents.
  - .12 Environmental Approvals.
  - .13 Basic Impact Assessment and Erosion and Sediment Control Plan.

### **1.14 RELICS AND ANTIQUITIES**

- .1 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on site or in buildings to be demolished, remain property of Owner. Protect such articles and request directives from Departmental Representative.
- .2 Notify Departmental Representative immediately if evidence of archaeological finds is encountered, immediately stop work in the affected area and await Departmental Representative's written instructions before proceeding with work in area.

### **1.15 FIELD ENGINEERING**

- .1 Survey Requirements
  - .1 Contractor shall hire and pay for a qualified surveyor.
  - .2 Contractor shall confirm that all provided survey data is accurate prior to performing the survey work. Notify the Departmental Representative in writing if the survey data varies from the detailed design.

- .3 Locate, confirm and protect control points prior and during construction. Preserve permanent reference points during construction.
- .4 The Department Representative will establish control points and provide:
  - .1 Complete set of Construction Drawings.
  - .2 Digital Design Model.
  - .3 Baseline Survey.
  - .4 Control Points and Geodetic Benchmarks.
- .5 The contractor to establish:
  - .1 Establish additional control points if necessary.
  - .2 Set all work stakes necessary to complete the work.
  - .3 Allow sufficient time to take measurements for payments. All quantities to be verified with the Department Representative.
  - .4 Protect all geodetic bench marks.
- .6 The contractor will be responsible to perform all layout work and site survey, monitor and provide quantity surveys for measurement and payment for all unit price items and all other survey incidentals required to complete the project.
- .7 The contractor will be responsible to provide the Department Representative with quantity surveys for all unit price items. No payment will be made without survey quantity submission.
- .2 Maintain an accurate log of any changes in the field. Perform an update to the "Record Drawings" on a regular basis to reflect these changes.
- .3 Subsurface Conditions
  - .1 Promptly notify Departmental Representative in writing if subsurface conditions at Place of the Work differ materially from those indicated in Contract Documents, or reasonable assumption of probable conditions based thereon.
  - .2 After prompt investigation, should Departmental Representative determine that conditions do differ materially, instructions will be issued for changes in the Work as provided in the contract procedures for Changes in the Work.

## **2 Products**

### **2.1 NOT USED**

- .1 Not used.

## **3 Execution**

### **3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

## **1 General**

### **1.1 MEASUREMENT FOR PAYMENT**

- .1 For each unit price item, Department Representative will calculate payment based on tendered unit price and Department Representative's determination of units of work item completed.
- .2 Method of measurement to be used is detailed in the section of the specification covering each work item.
- .3 Where a method of measurement for payment for a work item is not specified, it is considered to the work, payment for that item will be deemed to be included in another pay item or other pay items.

### **1.2 PROGRESS CLAIMS**

- .1 Contractor's Responsibilities:
  - .1 Submit progress claim to Department Representative within 5 working days after each month end. Claim to cover preceding month.
  - .2 Progress claim to include all labour and materials incorporated in Work and all materials stored at Site.
  - .3 Progress claim to include all agreed extras and deductions.
  - .4 Supply documentation to support claim for materials on site in the form of itemized lists or unpriced purchase orders showing quantities.
  - .5 Supply other evidence required by Department Representative in support of progress claim.
- .2 Department Representative's Responsibilities:
  - .1 Review Contractor's claim, prepare Progress Payment Certificate and issue to Department Representative within 10 working days following receipt of Contractor's claim.
  - .2 Department Representative's estimate of percentage of work completed will govern calculation of payment on all Progress Payment Certificates.
  - .3 Inform Contractor of amendments to claim by copy of Progress Payment Certificate.

### **1.3 CHANGE ORDERS**

- .1 Complete and promptly return all change price requests issued by Department Representative, quoting unit and/or lump sum prices as requested. Include appropriate supporting documentation to verify prices.
- .2 Do not proceed with work affected by price request until authorized to do so by Change Order.
- .3 Make no change in Work unless Change Order issued. Change Order is only valid when signed by Department Representatives and Contractor.

## **1.4 MEASUREMENT AND PAYMENT ITEMS**

### **.1 General Requirements**

.1 General Requirements will be measured as a Lump Sum item and will include: all costs related to project set-up, mobilization and demobilization of equipment, traffic accommodation including all required signage and barricades as per the approved Traffic Accommodation Plan, application of all permits, submission of all requested submittals, erection of site offices, temporary steel fencing minimum 1.8 m high around the work area, temporary erosion control measures as per the Erosion and Sediment Control Plan including the silt fence set-up, maintenance of the erosion control measures, Construction Survey including all incidentals required to perform survey and quantity measurements, protection of the existing trees including snow fence installation and all other incidentals required, dust control, clean-up and maintenance of the haul routes throughout the construction duration, cleaning of site throughout the construction and at the end of the project to the satisfaction of the Department Representative, restoration of all used sites including laydown yard to existing condition and better, general clean-up, labour, tools, materials, equipment and all other incidentals required to perform work under general requirements.

.2 Payment will be made as follows, as approved by the Parks Canada:

.1 50% of the Lump Sum bid will be included in the first progress payment certificate after the Contractor has established their operations and facilities and performed all the required submissions.

.2 40% of the Lump Sum bid will be included in the final progress payment certificate after the completion of the construction and removal of all equipment off site; and clean - up of the work areas to the satisfaction of the Department Representative.

.3 The remaining 10% of the Lump Sum to a minimum of \$ 10,000 will be retained for the entire warranty period of 2 year to ensure that the contractor performs maintenance of invasives and released after the expiry of the warranty period.

### **.2 Section 10 14 53 – Traffic Signage**

#### **.1 Supply and Install Signs**

.1 Supply and install signs will be measured and paid for by the unit installed.

.2 The unit price to include but is not limited to the supply and installation of the sign, hardware, labour, equipment, tools, materials and all other incidentals required to perform the work.

#### **.2 Supply and install Wooden Post**

.1 Supply and install wooden post will be measured and paid for by the unit installed.

.2 The unit price to include but not limited to excavation, supply and installation of the post, concrete, all hardware, labour, materials, tools and equipment and all other incidentals required to perform the work.

**.3 Supply and install Wooden Post Base**

.1 Supply and install wooden post base will be measured and paid for by the unit installed.

.2 The unit price to include but not limited, supply and installation of the telescopic post base, all hardware, labour, materials, tools and equipment and all other incidentals required to perform the work.

**.4 Supply and Install Large Size Custom Information Signs**

.1 Supply and install custom signs will be measured and paid for by the unit installed.

.2 The unit price to include but is not limited the supply and installation of the large size custom information sign as per detail, hardware, labour, equipment, tools, materials and all other incidentals required to perform the work.

**.3 Section 02 41 13.14 - Asphalt Pavement Removal**

**.1 Remove and dispose the existing asphalt (up to 100 mm Depth)**

.1 Remove and dispose the existing asphalt will be measured and paid by the square meter of asphalt removed to the specified depth.

.2 The unit price to include but is not limited to saw cutting, break-out, loading, removal and disposal of asphalt, transportation, disposal fees, general clean-up, labour, tools, equipment and all other incidents required to perform the work.

.3 The contractor will take possession of the removed asphalt and dispose it outside of Jasper National Park.

.4 There will be no payment made for removals beyond the limits specified or agreed to by the Department Representative. Contractor will restore the removed asphalt beyond the specified limits at his own costs.

**.4 Section 03 20 00 - Cast In Place Concrete**

**.1 Supply and Install Precast Concrete Pad for Waste Receptacle**

.1 Supply and install concrete pad will be paid for by the unit installed for the specified dimensions.

.2 The unit price will include but is not limited to transportation, excavation, supply and placement of gravel base course, compaction, supply and placement of pre-cast concrete pad leveled with the final elevation of the asphalt, general clean-up, labour, materials, equipment, tools and all other incidentals required to perform the work.

**.5 Section 31 23 16.26 - Rock Removal**

**.1 Boulder Excavation and Relocation (Subject to Deletion)**

.1 Boulder excavation and relocation will be measured and paid for the cubic meter of boulders relocated. The volume will be based on the calculated survey volume.

.2 The unit price will include but is not limited to excavation, loading, transportation, unloading and stockpiling, labour, tools and all other incidentals required to perform the work.

.3 The item is subject to deletion and based on ground conditions.

**.6 Section 31 24 13 - Roadway and Parking Lot Embankments**

**.1 Waste Excavation (Subject to Ground Conditions)**

.1 Waste excavation will be measured and paid for by the cubic meter of material excavated and removed off site. The waste volume will be calculated using survey cross section between the stripped ground and excavated ground.

.2 The unit price to include but is not limited to excavation to proposed elevations, separation of materials, if required, loading, hauling, and disposal of waste materials at Marmot Pit, clean- up of the haul routes, labour, materials, tools, equipment and all other incidentals required to perform the work.

.3 There will be no payment made for excavation and depth beyond the limits specified or agreed to on site by the Department Representative.

.4 Waste excavation to be transported and stockpiled at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot.

.5 Failure to clean- up the haul routes in timely manner will result in the Parks Canada performing the work and all related costs will be subtracted from the final progress payment. Therefore, Contractor to monitor the haul routes throughout the hauling period.

.6 This item is subject to deletion and based on the ground conditions.

**.2 Temporary Berm**

**.1 Common Excavation, Place and Compact (to be used for Embankment Construction)**

.1 The berm material to be reused for parking lot and embankment construction. The work will be measured and paid for under the common excavation item.

**.2 Reuse Berm Material for Site Restoration (100 mm Depth)**

.1 The remaining berm material to be used for site restoration purposes.

.2 Reuse material will be measured and paid for by the square meter of the surveyed surface placed to the specified depth.

.3 The unit price to include but is not limited to excavation, loading, transportation to designated location on site, placement of the material, spreading, compaction, labour, equipment, tools and all other incidentals required to perform the work.

**.3 Import, Place and Compact Granular Material (Owner Supplied)**

.1 Import, place and compact granular material will be measured and paid for per cubic meter of material imported and placed. Measurement will be based on the volume of material compacted in placed. The import volume will be calculated using survey cross sections comparing the stripped ground and the final subgrade elevation.

.2 The unit price to include but is not limited to excavation, loading, hauling, keying into the existing embankment slope, placement of new granular material obtained at the Marmot Pit, compacting, moisture conditioning, shaping, rough and fine grading to proposed design cross section, reworking all locations that did not pass the compaction requirements, removal and disposal of all access material, clean-up of all haul routes, labour, materials, tools, equipment and all other incidents required to perform the work.

.3 The granular material will be obtained from a stockpile at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot.

.4 All haul routes to be inspected prior to commencement of work and again following completion of work to determine clean-up requirements. Any clean-up work not performed in a timely manner will be completed by Parks Canada with all related costs deducted from final payments.

.4 Common Excavation, Place and Compact

.1 Common excavation, place and compact will be measured and paid for by the cubic meter of material excavated, place and compacted. Measurement will be based on the surveyed volume of material compacted in place. Volumes will be calculated by comparing the initial cross section excluding construction of embankment benching/ or keying into slope to new cross section prior to placement of import granular material.

.2 The unit price to include but is not limited to excavation, loading, hauling, scarifying and leveling the ground, placement of excavated material, compaction to achieve the required densities, moisture conditioning, shaping, rough and fine grading to proposed cross section, reworking all locations that did not satisfy compaction requirements, labour, materials, tools, equipment and all other incidentals required to perform the work.

.3 Portion of the temporary berm and slope material will be used to construct the parking lot and access road.

.5 Subgrade Preparation (300 mm Depth)

.1 Subgrade preparation will be measured and paid for by the square meter of surveyed subgrade surface prepared to specified depth. Measurements to be taken at the final subgrade elevation.

.2 The unit price to include but is not limited to scarifying the subgrade to specified depth, shaping, grading, application of water to achieve the optimum moisture content, compaction to achieve the required densities, reworking, shaping and compacting any areas that failed to meet the required densities, labour, materials, equipment, tools and all other incidentals required to perform the work.



**.7 Section 31 32 19.01 – Geotextile**

- .1 Supply and Install Geofabric (Subject to Ground Condition)
  - .1 Supply and install geofabric will be measured and paid for by the square meter of geofabric surface installed excluding the overlap.
  - .2 The unit price to include but is not limited to supply and install geofabric as per manufacturer recommendations, pin/anchors, labour, tools, material, equipment, and all other incidentals required to perform the work.
  - .3 Geofabric is incidental to the rip rap, culvert, and subdrain supply and installation.
  - .4 This item is subject to deletion and based on the ground conditions.

**.8 Section 31 36 00 - Gabion**

- .1 Supply and Install Gabion Retaining Wall at View Point 1
  - .1 Supply and Install Gabion Retaining Wall will be measured and paid for by the square meter of finished retaining wall face installed.
  - .2 The unit price to include but is not limited to excavation, cutting, break-out, removal and disposal of existing wooden retaining wall outside of Jasper National Park, Gabion wall design, preparation of the subgrade grade, supply and placement of granular material for the retaining wall base, supply and installation of gabion baskets including geotextile, placements of the rock found to the specified gradation, backfill, compaction, grading around the retaining wall, loading, hauling and disposal of excess material at Marmot Pit, labour, material, tools and incidentals required to perform the work.
  - .3 Retaining wall rock fill is available at and around View Point 1. Contractor to select suitable rock size to specified gradation.
  - .4 The wall design to be stamped and sealed by a professional engineer practicing in Alberta, Canada.

**.9 Section 31 37 00 - Rip Rap**

- .1 Supply and Place Rip Rap (Contractor Supplied)
  - .1 Supply and place rip rap will be measured and paid for in square meter of final rip rap surface area placed.
  - .2 The unit price to include but is not limited to excavation, preparation of surface for placement of rip rap, compaction of bed, supply and placement of rip rap stone as per detail including of geofabric at the bottom of the ditch, supply and rip rap placement at the step-down face, at the general clean -up, labour, material, tools, equipment and all other incidentals required to perform the work.
- .2 Place Rip Rap (Found on Site) (Subject to Deletion)
  - .1 Place rip rap will be measured and paid for in square meter of final rip rap surface area placed.
  - .2 The unit price to include but is not limited to excavation, salvage and stockpiling of rip rap stone to gradation indicated on site, preparation of surface for placement of rip rap, compaction of bed, placement of rip rap stone found on

site during the excavation, supply and placement geofabric at the bottom of the ditch, general clean -up, labour, material, tools, equipment and all other incidentals required to perform the work.

.3 The intent of this item is to salvage and reuse rocks found on site during the excavation that are adequate in size to use as ditch armoring. Refer to section 31 37 00 for stone gradation.

.4 No differentiation will be made between Class 1 and Class 2 for this item.

.5 This item is subject to deletion and based on material availability on site.

#### **.10 Section 32 11 23 - Aggregate Base Course**

##### **.1 Import, Place and Compact Granular Base Course (Owner Supplied)**

.1 Import, place and compact granular base course will be measured and paid for by the square meter of surveyed granular material surface area placed. Measurements to be taken at the final base course elevation.

.2 The unit price to include but is not limited to excavation, loading, hauling, placement of the granular base material, grading to achieve the required cross section, application of water to achieve the optimum moisture content, compaction, reworking of areas that did not satisfy the density requirements, hauling excess material off site, clean-up of site and haul routes, labour, materials, equipment, tools and all other incidentals required to perform the work.

.3 The granular base material will be obtained from a stockpile at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot.

#### **.11 Section 32 12 16 - Asphalt Paving**

##### **.1 Asphalt Concrete Paving Type: M1, Grade: PG 52-34**

.1 Asphalt Paving for the depths and type listed in the bid form will be measured and paid for by the square meter of surveyed asphalt surface placed. Measurements to be taken at the final asphalt elevation.

.2 The price to include but is not limited to preparation of mix design and job mix formula, supply, crushing and hauling aggregates, blending of aggregates, supplying and mixing asphalt binder with the aggregate in amounts called for in the mix design, saw cutting to ensure clean vertical edges for asphalt tie-ins, removal and disposal of loose debris, prime and tack coat, supply and placement of asphalt, compaction, labour, materials, equipment, tools and all other incidentals required to perform the work.

.3 All haul routes shall be inspected prior to commencement of work and again following completion of work to determine clean-up requirements. Any clean-up work not performed in a timely manner will be completed by Parks Canada with all related costs deducted from final payment.

## **.12 Section 32 17 23 - Pavement Markings**

- .1 Supply and Install Pavement Markings will be as follows:
  - .1 100 mm White Shoulder Lane Line
    - .1 100 mm White Shoulder Lane Line will be measured and paid for by the linear meter of line installed.
  - .2 100 mm Yellow Center Lane Line
    - .1 100 mm Yellow Center Lane Line will be measured and paid for by the linear meter of line installed.
  - .3 100 mm White Parking Stall Line
    - .1 100 mm Yellow Parking Stall Line will be measured and paid for by the linear meter of actual line installed.
  - .4 100 mm Yellow Hatch Line
    - .1 100 mm Yellow Hatch Line will be measured and paid for by the linear meter of actual line installed.
  - .5 600 mm White Zebra Crossing Line
    - .1 600 mm White Zebra Crossing Lines will be measured and paid for by the line installed.
  - .6 Directional Arrow
    - .1 Single Turning Arrow will be measured and paid for by the unit supplied and installed
  - .7 Blue Handicapped Parking Symbol
    - .1 Blue Handicapped Parking Symbol will be measured and paid for by the unit supplied and Installed
- .2 The unit to include but is not limited to, labour, materials, equipment, tools and all other incidentals required to perform the work.

## **.13 Section 32 91 19.13 - Topsoil Placement and Grading**

- .1 Remove and dispose stockpiled Topsoil
  - .1 Remove and dispose stockpiled topsoil will be measured and paid for by the cubic meter of topsoil removed and disposed. Measurement will be based on the surveyed volume of material. Volumes will be calculated by comparing the initial stockpile cross sections to final stockpile cross sections.
  - .2 The unit price to include but is not limited to loading, transportation, unloading, stockpiling at designated location on Marmot Pit, labour, material tools, and all other incidentals required to perform the work.
  - .3 Topsoil to be transported and stockpiled at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot.
- .2 Remove and dispose stockpiled Mulch
  - .1 Remove and dispose stockpiled mulch will be measured and paid for on a lump sum basis.

- .2 The unit price to include but is not limited to loading, transportation, unloading, stockpiling at designated location on Marmot Pit, labour, material tools, and all other incidentals required to perform the work.
- .3 Topsoil to be transported and stockpiled at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot.
- .3 Place existing Topsoil in ditches (100 mm Depth)
  - .1 Place existing topsoil in ditches will be measured and paid for by the square meter of surveyed final surface placed.
  - .2 The unit price to include but is not limited to loading, hauling, placement of topsoil, spreading, compaction, removal and disposal of all weeds, roots and lumps and stones larger than 25mm in diameter, labour, materials, equipment, tools and all other incidentals required to perform the work.
  - .3 The contractor will be responsible to perform invasive species control through the warranty period.
- .4 Place existing Topsoil in Restoration Zones (100mm – 400mm Depth)
  - .1 Place existing topsoil in restoration zones will be measured and paid for by the square meter of surveyed final surface placed.
  - .2 The unit price to include but is not limited to loading, hauling, placement of topsoil, spreading, compaction, removal and disposal of all weeds, roots, and lumps and stones larger than 20mm in diameter, labour, materials, equipment, tools and all other incidentals required to perform the work.
  - .3 The contractor will be responsible to perform invasive species control through the warranty period.

#### **.14 Section 32 93 10 – Tree, Shrub and Groundcover Planting**

- .1 Supply and install of tree saplings and willow stakes
  - .1 Supply and install tree saplings and willow stakes will be measured and paid for per unit installed.
  - .2 Monthly progress payments made for unit price bid and measured quantities of work will be subject to Department representative's review and acceptance of Contractor's workmanship and performance. Contractor shall ensure all work has been completed in accordance with contract specifications.
  - .3 The unit price to include but is not limited to local sourcing, loading, hauling, excavation of plant pits, topsoil backfilling, staking, supply and mixing of fertilizer, watering, and or additives as required, removal and disposal of all weeds, roots and lumps and stones larger than 25mm in diameter, labour, materials, equipment, tools, and all other incidentals required to perform the work.
  - .4 The contractor will be responsible to perform maintenance of the saplings throughout the warranty period. Please refer to relevant sections for maintenance requirements.

- .2 Install 150 Whitebark Pine saplings
  - .1 Install 150 Whitebark Pine saplings will be measured and paid for per unit installed.
  - .2 Monthly progress payments made for unit price bid and measured quantities of work will be subject to Department Representative's review and acceptance of Contractor's workmanship and performance. Contractor shall ensure all work has been completed in accordance with contract specifications.
  - .3 The unit price to include but is not limited to loading, hauling, excavation of plant pits, topsoil backfilling, staking, supply and mixing of fertilizer, watering, and or additives as required, removal and disposal of all weeds, roots and lumps and stones larger than 25mm in diameter, labour, materials, equipment, tools, and all other incidentals required to perform the work.
- .3 Supply and install Log Pond Sediment Control Structure
  - .1 Supply and install of log pond sediment control structure will be measured and paid for by the unit installed as per detail.
  - .2 The unit price to include but not limited to supply and installation of all ground logs, cover logs, brace logs, rebar, coirmat 900 or equivalent alternative, willow stakes (*Salix drummondiana*), filter fabric, labour, material, tools, equipment and all other incidentals required to perform the work.
  - .3 The contractor will be responsible to perform maintenance of the Log Pond Sediment Control Structure throughout the warranty period. Please refer to relevant sections for maintenance requirements.
- .4 Place locally sourced Woody Debris
  - .1 Place woody debris will be measured and paid for by the unit cubic meter installed.
  - .2 The unit price to include but is not limited to screening the stockpiled topsoil for woody debris, placement of locally sourced woody debris material through the restoration area, labour, tools, equipment, and all other incidentals required to perform the work.
  - .3 The contractor will be responsible to perform maintenance of the woody debris throughout the warranty period. Please refer to relevant sections for maintenance requirements.

#### **.15 Section 33 31 14 - Sewage Tank**

- .1 Supply and Install Washroom Structure including Septic System and Concrete Pad
- .2 Supply and Install Washroom Structure including Septic System and Concrete Pad will be measured and paid for by the entire system installed.
- .3 The unit price to include but is not limited to excavation to design, required elevation, preparation of subgrade, supply and installation of the sewage tank including all fittings as per detail, concrete blocking, imported backfill material, compaction, supply and installation of the concrete pad, supply and installation of the

washroom structure as per detail including all fittings, all labour, tools, materials, equipment and all other incidentals required to perform the work.

**.16 Section 33 42 13 - Pipe Culverts**

**.1 Supply and install CSP Culvert including Flared End Sections**

- .1 Supply and install CSP culvert will be paid by the linear meter of culvert installed and measured along the centerline of the new pipe.
- .2 The unit price to include but is not limited to excavation, trenching, supply and installation of culvert pipe c/w flared end sections, crushed gravel for pipe zone, backfill with imported borrow material or suitable native, compaction, clay cap, supply and installation of non-woven geotextile as per detail, grading around the inlet and outlet, removal of excess/ unsuitable material to Marmot Pit, general clean-up, labour, materials, equipment, tools and all other incidentals required to perform the work.

**.17 Section 33 46 16 - Subgrade Drainage Network**

**.1 Supply and Install 150 mm dia. PVC SDR 35 Perforated Sub-Drain**

- .1 Supply and install 150 mm dia. perforated sub-drain will be paid for by the linear meter of pipe installed and measured along the centerline of the pipe.
- .2 The unit price will include but is not limited to excavation, trenching, supply and installation of perforated sub-drain pipe with washed rock wrapped in geotextile as per detail, compaction, excess material to be reused for embankment construction where required, general cleaning, labour, equipment, tools, material and all other incidentals required to perform the work.

**.2 Supply and install Seepage Zone Control (Subject to Ground Conditions)**

- .1 Supply and install seepage zone control will be measured and paid for by the square meter of control installed as per detail for each scenario.
- .2 The unit price to include but is not limited to excavation, preparation of the subgrade material to install the seepage zone control, supply and installation of washed rock wrapped in geofabric (seepage zone control) with a minimum overlap of 0.6 m as per detail, fusing of fabric, backfill of native material, compaction, removal and disposal of any unsuitable material, labour, materials, tools and all other incidentals required to perform the work.

**.18 Miscellaneous**

**.1 Salvage and reinstall the existing Temporary Retaining Wall Blocks for delineation (subject to deletion)**

- .1 Salvage and reinstall the existing retaining wall blocks for delineation will be measured and paid for by the block unit reinstalled at any location within the construction site.
- .2 The unit price to include but is not limited to load, transportation, unloading at designated location within construction site, arrange the blocks to satisfaction of the Department Representative, general clean-up, labour, equipment, tools, and all other incidentals required to perform the work.

- .3 This item is subject to deletion.
- .2 Remove and dispose the existing Retaining Wall Blocks (Refer to Drawings)
  - .1 Remove and dispose the existing block retaining wall will be measured paid for by the block unit disposed.
  - .2 The price to include but is not limited to load, transportation, unloading and stockpiling at designated location at Marmot Pit, general clean-up, labour, equipment, tools, and all other incidentals required to perform the work.
  - .3 The retaining wall blocks to be transported and stockpiled at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot.
- .3 Remove and dispose the existing Retaining Wall Section (Refer to Drawings)
  - .1 Remove and dispose the existing block retaining wall will be measured paid for by the unit.
  - .2 The price to include but is not limited to load, transportation, unloading and stockpiling at designated location at Marmot Pit, general clean-up, labour, equipment, tools, and all other incidentals required to perform the work.
  - .3 The retaining wall blocks to be transported and stockpiled at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot.
- .4 Construct a 2.0 m wide Parking Lot Connection Trail
  - .1 Construct a parking lot connection trail will be measured and paid for by the linear meter of trail installed.
  - .2 The unit price to include but it not limited to subgrade preparation to achieve specified densities, water, compaction, supply, placement and shaping the granular base course to the specified cross section, water, compaction, supply and installation of asphalt, general clean-up labour, tools, materials, equipment and all other incidentals required to perform the work.
- .5 Repair Existing Asphalt Trail
  - .1 Repair existing asphalt trail will be measured and paid for by the square meter of trail surface repaired.
  - .2 The unit price to include but is not limited to saw cutting, removal and disposal of trail asphalt, moving and rearranging of boulders on the side slopes to provide support for the trail embankment reconstruction (boulders available within the vicinity), supply and placement of embankment gravel and granular base course, compaction, scarification, shaping and compaction of existing base gravel, supply and placement of asphalt, general clean-up, labour, material, equipment, tools and all other incidentals required to perform the work.
  - .3 The contractor to take possession of the removed trail asphalt, load, transport and dispose it outside of Jasper National Park.
  - .4 The current existing asphalt trail is between 1.2 and 1.5 m wide. Contractor will be responsible to select appropriate equipment to perform the trail work.

- .6 Install Waste Receptacle
  - .1 Install waste receptacle will be measured and paid for by the unit installed.
  - .2 Parks Canada will supply the waste receptacle to site for installation.
  - .3 The unit price to include but is not limited to leveling, installation of the waste receptacle, hardware, labour, materials, equipment, tools and all other incidentals required to perform the work.
- .7 Supply and Install Rustic Backless Log Bench
  - .1 Install waste receptacle will be measured and paid for by the unit installed.
  - .2 The unit price to include but is not limited to preparation of the surface fir bench installation, supply and installation of the bench, hardware, labour, materials, equipment, tools and all other incidentals required to perform the work.
- .8 Construct a Seat Node
  - .1 Construct Seat Node will be measured and paid for by the node constructed.
  - .2 The unit price to include but is not limited to moving of rocks/boulders to dimensions indicated for accommodating the rustic log bench and to the satisfaction of the Department Representative, excavation, leveling of the existing ground, moving and arranging of boulders to act as a slope retaining wall, general clean-up, labour, tools, materials, equipment and all other incidentals required to perform the work.
- .9 Supply and install Pre-Cast Low Profile Parking Curb
  - .1 Supply and install Pre-Cast Low Profile Parking Curb will be measured and paid for by the unit installed.
  - .2 The unit price to include but is not limited to, drilling, anchoring, supply and installation of pre-cast low profile parking curb, labour, tools, equipment, material and all other incidentals required to perform the work.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



## **1 General**

### **1.1 APPOINTMENT AND PAYMENT**

- .1 Departmental Representative will appoint and pay for services of qualified testing laboratory except:
  - .1 Inspection and testing performed exclusively for convenience.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.
- .3 The contractor can perform their own material testing throughout the project to ensure accuracy of the Department Representative's test result. The costs for the testing will be included in the contractor's Quality Assurance and Control program and is considered incidental to the work and will not be reimbursed separately. In case of a dispute, if no testing has been performed by the contractor, the Department Representative's test results will be considered accurate and govern.

### **1.2 CONTRACTOR'S RESPONSIBILITIES**

- .1 Provide labour, equipment and facilities to:
  - .1 Provide access to Work for inspection and testing.
  - .2 Facilitate inspections and tests.
  - .3 Make good on Work disturbed by inspection and testing.
  - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Department Representative 48 hours minimum in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and make good on Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

**2 Products**

**2.1 NOT USED**

.1 Not Used.

**3 Execution**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 ADMINISTRATIVE**

- .1 Parks Canada will designate a representative to act on behalf of the Department.
- .2 Department Representative will schedule and administer pre construction and bi-weekly project meetings.
- .3 Contractor's superintendent and senior representatives of major subcontractors to attend all meetings.
- .4 Distribute written notice of each meeting four days in advance of meeting date to major subcontractors.
- .5 Department Representative will provide physical space and make arrangements for meetings.
- .6 Department Representative will record the meeting minutes.
- .7 Department Representative will reproduce and distribute copies of minutes within 7 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.

### **1.2 PRECONSTRUCTION MEETING**

- .1 Department Representative will schedule a pre-construction meeting of parties in contract within 10 days after contract award to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of Contractor, major Subcontractors, supervisors to be in attendance.
- .3 After time and location of the meeting has been established, the Contractor to notify parties concerned minimum 5 days before meeting.
- .4 Department Representative will record the discussions and decisions, and circulate the meeting minutes to all parties in concern.
- .5 Agenda to include:
  - .1 Introduction of the Project Personal.
  - .2 Notice of Award/Agreement.
  - .3 Project Work Review.
  - .4 Project Schedule.
  - .5 Temporary facilities.
  - .6 Permits.
  - .7 Access and Easements.
  - .8 Environmental.
  - .9 Occupational Health and Safety.

- .10 Emergency Services.
- .11 Hours of Work.
- .12 Progress Payment Certificate.
- .13 Lien Fund.
- .14 Force Accounts.
- .15 Contract Change Orders.
- .16 Construction Documents and Design Drawings.
- .17 Construction Survey.
- .18 Record Drawings.
- .19 Material Testing.
- .20 Submissions
- .21 Insurances, transcript of policies.
- .22 Other Business.

### **1.3 PROGRESS MEETINGS**

- .1 Progress meetings will be held bi-weekly, or more frequently if required.
- .2 Senior representatives of Contractor, major Subcontractors, supervisors to be in attendance.
- .3 After time and location of the meeting has been established, the Contractor to notify parties concerned minimum 5 days before meeting.
- .4 Department Representative will record the discussions and decisions, and circulate the meeting minutes to all parties of concern.
- .5 The Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Construction schedule and review of work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Corrective measures and procedures to regain projected schedule.
  - .6 Revision to construction schedule.
  - .7 Progress schedule, during succeeding work period.
  - .8 Review submittals
  - .9 Pending changes and/or substitutions.
  - .10 Safety issues/concerns.
  - .11 Other business.

**2 Products**

**2.1 NOT USED**

.1 Not Used.

**3 Execution**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 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. Generally, Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Sunday, inclusive will provide a seven day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as work days or work weeks.
- .6 Master Plan: summary level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

### **1.2 REQUIREMENTS**

- .1 Develop and submit a Project Master Schedule that its Schedules are practical and remain within specified Contract duration.
- .2 Include all identified contract work in the Project Schedule.
- .3 Plan to complete Work in accordance with prescribed milestones and time frame.
- .4 Limit activity durations to maximum of approximately 14 working days, to allow for progress reporting.

- .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 the following sections in the Project Schedule:
  - .1 01 11 00 - General Requirements.
  - .2 01 35 43 - Environmental Procedures.

### **1.3 SUBMITTALS**

- .1 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.

### **1.4 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule.
- .2 Construction for the Access Road and Parking Lot may commence after the contract award in 2017. Access road and parking lot work shall be completed by October 31, 2017.
- .3 Trail work to be performed outside of the visitor season and during the following periods:
  - .1 Following the contract Award and prior to June 5, 2017;
  - .2 September 15 to October 31, 2017.
- .4 Carry over work may be completed between May 15 and October 31, 2018.

### **1.5 MASTER PLAN**

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

### **1.6 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
  - .1 Mobilization.
  - .2 Removals
  - .3 Earthworks
  - .4 Construction of Access Road, Parking Lot, Trail,

- .5 Storm Water Management
- .6 Landscaping/Restoration of Site
- .7 Trail Repairs
- .8 Line Painting
- .9 Miscellaneous
- .10 Demobilization

## **1.7 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



## **1 General**

### **1.1 SUBMITTAL REQUIREMENTS**

- .1 A list of submittals is provided below. This list may not include all required submissions. The contractor to review the specifications for submittal requirements.
  - .1 Project schedule: List of Sub-contracts and Suppliers.
  - .2 Contractors chain of command including Subcontractors.
  - .3 Work plan.
  - .4 Shop Drawings.
  - .5 Asphalt Mix Design and product data.
  - .6 Samples.
  - .7 Certificates.
  - .8 Traffic Accommodation Strategy.
  - .9 Acknowledgement for BIA, ESC and Restoration Plan.
  - .10 Emergency Response Plan.
  - .11 Site specific Health and Safety Plan.
  - .12 Submit WHMIS MSDS - Material Safety Data Sheets
  - .13 Hazardous Spill Plan.
  - .14 Record Drawings and all Pertaining Reports.

### **1.2 ADMINISTRATIVE**

- .1 Submit to Department 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 At Department Representative's request, prepare and submit schedule fixing dates for submission and return shop drawings, product data and or samples.
- .3 Do not proceed with Work affected by submittal until review is complete.
- .4 Present shop drawings, product data, samples and mock ups in SI Metric units.
- .5 Where items or information is not produced in SI Metric units converted values are acceptable.
- .6 Review submittals prior to submission to Department Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated 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.
- .7 Notify Department Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8 Verify field measurements and affected adjacent Work are coordinated.

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

### **1.3 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 Province of Alberta, Canada.
- .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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 5 days for Department Representative's review of each submission.
- .5 Adjustments made on shop drawings by Department Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Department Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Department 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.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.
- .9 After Department Representative's review, distribute copies.
- .10 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Department Representative.
- .11 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Department Representative.
- .12 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Department Representative.
- .13 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .14 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Department Representative.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Department 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.
- .18 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that PWGSC approves detailed 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.

#### **1.4 SAMPLES**

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

### **2 Products**

#### **2.1 NOT USED**

- .1 Not Used.

### **3 Execution**

#### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 SECTION INCLUDES**

- .1 Health and safety considerations required to ensure that PWGSC shows due diligence towards health and safety on construction sites, and meets the requirements laid out in PWGSC/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.

### **1.2 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Alberta
  - .1 Occupational Health and Safety Act, R.S.A. 2000.

### **1.3 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 Submittal Procedures.
- .2 Submit site specific Health and Safety Plan: Within 14 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .4 Submit copies of incident and accident reports.
- .5 Submit WHMIS MSDS - Material Safety Data Sheets.
- .6 Department Representative will review Contractor's site specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Department Representative within 7 days after receipt of comments from Department Representative.
- .7 Department 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.
- .8 Submit, and post at work site, the emergency numbers for police, fire and ambulance for the locale of the work, as well as the names and after hours' number for key site personal related to health, safety or security of the site.

### **1.4 SAFETY ASSESSMENT**

- .1 Perform site specific safety hazard assessment related to project.
- .2 Submit hazard assessments to Department Representatives on a weekly basis.

## **1.5 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Department Representative prior to commencement of Work.
- .2 Arrange for "Tool Box" safety meetings and submit report to Department Representative on a weekly basis.

## **1.6 REGULATORY REQUIREMENTS**

- .1 Do Work in accordance with Section 01 41 00 Regulatory Requirements.
- .2 Comply with the specified standards and regulations to ensure safe operations on site.

## **1.7 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 Department Representative may respond in writing, where deficiencies or concerns are noted and may request re submission with correction of deficiencies or concerns.

## **1.8 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.

## **1.9 COMPLIANCE REQUIREMENTS**

- .1 Comply with Occupational Health and Safety Act, General Safety Regulation, Alberta Reg. 62/2003.

## **1.10 UNFORESEEN 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 Alberta and advise Department Representative verbally and in writing.

## **1.11 HEALTH AND SAFETY COORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative to fulfill the role as Health and Safety Coordinator. The supervisor or foreman may satisfy the role of Health and Safety Coordinator. Health and Safety Coordinator must:
  - .1 Have site related working experience.
  - .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.

.1 Be on site during execution of Work and report directly to and be under direction of site supervisor.

#### **1.12 POSTING OF DOCUMENTS**

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

#### **1.13 CORRECTION OF NON COMPLIANCE**

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

#### **1.14 BLASTING**

- .1 Obtain Department Representative's approval for blasting. Department Representative, in granting approval, does not assume any responsibility for Contractor's methods or for injury, loss of life or damage resulting therefrom.
- .2 Obtain insurance coverage for blasting operations prior to commencing of such operations.
- .3 Repair pay for any damage resulting from blasting operations.
- .4 No payment will be made for blasting beyond limits indicated. Contractor will be responsible to restore beyond the limits.

#### **1.15 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**

**2.1 NOT USED**

.1 Not used.

**3 Execution**

**3.1 NOT USED**

.1 Not used.

**END OF SECTION**



## **1 General**

### **1.1 REQUIREMENTS**

- .1 Refer to and perform work in accordance with the "Edith Cavell Rehabilitation Basic Impact Analysis" supplied in Appendix A.
- .2 Refer to and perform work in accordance with the "Edith Cavell Rehabilitation Erosion and Sediment Control Plan" supplied in Appendix B.
- .3 Refer to and perform work in accordance with "Edith Cavell Rehabilitation Restoration Plan" supplied in Appendix C.

### **1.2 REFERENCES**

- .1 Definitions:
  - .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
  - .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.
  - .3 Parks Canada Agency (PCA): owner of the project as represented by designated parties and employees.
  - .4 Department Representative: Associated Engineering Alberta Ltd., Associated Environmental Consultants Inc., their employees, and designated representatives.
  - .5 Contractor: Party retained to complete Edith Cavell Rehabilitation construction and restoration works, their employees, subcontractors, and subcontractors' employees.
  - .6 Department Representative: designated representative(s) of PCA.
  - .7 Environmental Surveillance Officer (ESO): designated representative(s) of PCA.

### **1.3 BASIC IMPACT ANALYSIS (BIA)**

- .1 Prior to tender submission, Contractor to read and understand the "Edith Cavell Rehabilitation Basic Impact Analysis (BIA)".
- .2 Prior to commencement of work, contractor to submit written confirmation that the "Edith Cavell Rehabilitation Basic Impact Analysis (BIA)" was read, understood, and will be followed.
- .3 Contractor is responsible to ensure the "Edith Cavell Rehabilitation Basic Impact Analysis (BIA)" is understood and followed by project employees, subcontractors, and subcontractors' employees.

### **1.4 EROSION AND SEDIMENT CONTROL PLAN (ESC PLAN)**

- .1 Prior to commencement of work, Contractor to read and understand the "Edith Cavell Rehabilitation Erosion and Sediment Control Plan".

- .2 Contractor to submit written confirmation that the "Edith Cavell Rehabilitation Erosion and Sediment Control Plan" was read, understood, and will be followed.
- .3 Contractor is responsible to ensure the "Edith Cavell Rehabilitation Erosion and Sediment Control Plan" is understood and followed by Contractor's employees, subcontractors, and subcontractors' employees.

## **1.5 RESTORATION PLAN**

- .1 Prior to commencement of work, Contractor to read and understand the "Edith Cavell Rehabilitation Restoration Plan".
- .2 Contractor to submit written confirmation that the "Edith Cavell Rehabilitation Restoration Plan" was read, understood, and will be followed.
- .3 Contractor is responsible to ensure the "Edith Cavell Rehabilitation Restoration Plan" is understood and followed by project employees, subcontractors, and subcontractors' employees.

## **1.6 PRE-CONSTRUCTION REQUIREMENTS**

- .1 Two (2) weeks prior to commencement of work, Contractor to notify the Department Representative of planned construction commencement date.
- .2 On-site environmental briefing to be scheduled by the Environmental Surveillance Officer (ESO), and attended by Department Representative, Contractor's superintendent, site foreman, and senior representatives of major subcontractors.
- .3 Project limits to be flagged by the Contractor in consultation with the Departmental Representative or the Environmental Surveillance Officer, and the Project Engineer.
- .4 Construction to occur only with Applicable Special Activity Permits (issued by Department Representative).

## **1.7 CONSTRUCTION TIMING**

- .1 Construction to occur only between May 15 and October 31, annually.
  - .1 Parks Canada will plough snow on the Edith Cavell Road between Hwy 93 and Mt. Edith Cavell Recreational Site. The contractor will be responsible to clear snow from the entire construction site including lay-down yard.
  - .2 Trail work to occur after snow is melted, ground is thawed, and impact mitigation measures to protect sensitive plants are appropriately implemented.
  - .3 If applicable, collection and propagation of native plant material for restoration to occur as specified in the "Edith Cavell Rehabilitation Restoration Plan" and in consultation with the Departmental Representative.
  - .4 Trail work to be performed outside of the visitor season and during the following periods:
    - .1 Following the contract Award and prior to June 5, 2017;
    - .2 September 15 to October 31, 2017.

.5 No access to Edith Cavell area during Overwintering Period for Woodland Caribou in the Tonquin caribou range (November 1 to February 15; amended by PCA from time to time).

.6 No removal of vegetation during the A4 Migratory Bird Protection Period (April 17 to August 31 annually; amended by Environment Canada from time to time).

## **1.8 HAZARDOUS SUBSTANCE CONTROL MEASURES AND SPILL RESPONSE**

.1 Contractor to prepare and submit to the Department Representative a Hazardous Spill Response Plan. This plan to include procedures, instructions, and reporting standards to be used in event of unforeseen spill of regulated substance.

.1 Hazardous Spill Response Plan to meet specifications detailed in the “Edith Cavell Rehabilitation Basic Impact Analysis” and include any additional measures employed by the Contractor.

.2 All hazardous materials anticipated on-site and used in machinery to be identified in the Hazardous Spill Response Plan, and to be accompanied by substance control measures, spill mitigation measures, and best practices to be employed.

## **1.9 PROTECTION OF SENSITIVE SPECIES AND CULTURAL RESOURCES**

.1 Contractor to ensure all personnel and equipment remain outside of any 5.0 m radius buffer established around whitebark pine (*Pinus albicaulis*) trees by Department Representative or Environmental Surveillance Officer.

.2 Contractor to report sightings of Woodland Caribou (*Rangifer tarandus caribou*) in the project area to the Project Engineer and to PCA biologists through Jasper Dispatch (780-852-6155) as soon as feasibly possible.

.1 Contractor to suspend construction activities near any Woodland Caribou observed in the project area until the animal leaves on its own accord, or upon direction from the Department Representative.

.3 Contractor to immediately suspend construction activities at the location of a discovered cultural or historical artifact, and report the discovery to Jasper Dispatch (780-852-6155).

.4 Contractor to protect all existing cultural infrastructure (historical information signage, existing stonework, signage, and main trailhead) from damage.

## **1.10 EROSION AND SEDIMENTATION CONTROL PLAN**

.1 Erosion and sediment control measures to be inspected weekly, and within 24 hours of a precipitation event (as per schedule defined in “Edith Cavell Rehabilitation Erosion and Sediment Control Plan”), and maintained as required.

.2 Contractor to submit copies of weekly ESC inspection checklist and documentation of all ESC maintenance activities to the Environmental Surveillance Officer (ESO) through the Engineering Consultant by 17:00 on the business day following each weekly inspection.

## **1.11 NATIONAL PARK REGULATIONS**

- .1 Contractor to perform all work in accordance with the ordinances, laws, rules and regulations set out in the *Canada National Parks Act and Regulations*.
- .2 Contractor to display a valid vehicle work pass issued by Parks Canada Agency in all vehicles.

## **1.12 FIRES**

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

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

- .1 Execution of work is subject to provisions within the Canadian Environmental Assessment Act (CEAA) Guidelines Order of 2012, subsequent amendments, and Parks Canada's Interim Directive on Implementation of the Canadian Environmental Act 2012.
- .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.

## **1.14 NOTIFICATION**

- .1 Department Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Department Representative of proposed corrective action and take such action for approval by Department Representative.
  - .1 Take action only after receipt of written approval by Department Representative.
- .3 Department Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

### **3 Execution**

#### **3.1 CLEANING**

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

**END OF SECTION**

## **1 General**

### **1.1 REFERENCES AND CODES**

- .1 Perform Work in accordance with the codes, regulations, and standard listed below Amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply:
  - .1 Alberta Transportation and Utilities.
  - .2 National Transportation Agency Canada.
  - .3 Alberta Environment and Parks.
  - .4 Fisheries and Oceans Canada.
  - .5 Environment Canada.
  - .6 National Building Code of Canada.
  - .7 Occupational Health and Safety.
- .2 Meet or exceed requirements of:
  - .1 Contract documents.
  - .2 Specified standards, codes and referenced documents.

### **1.2 COMPLIANCE WITH REGULATIONS**

- .1 Ascertain requirements and regulations listed above.
- .2 Comply with all such requirements and regulations as applicable to the work.
- .3 Requirements set out in this section are for guidance and information are not necessarily complete.

### **1.3 PERMITS**

- .1 Obtain all required construction permits including but is not limited to:
  - .1 Parks Canada Business License.
  - .2 Special Activity Permit.

### **1.4 NATIONAL PARKS ACT**

- .1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

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**3            Execution**

**3.1        NOT USED**

.1    Not Used.

**END OF SECTION**

## **1 General**

### **1.1 TESTING LABORATORY SERVICES**

- .1 Qualified Testing Agency will be engaged by Department Representative for purpose of testing portions of Work. Cost of such services will be borne by Parks Canada.

### **1.2 INSPECTION**

- .1 Allow Department 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 Department Representative instructions, 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 Department 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.

### **1.3 ACCESS TO WORK**

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

### **1.4 PROCEDURES**

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

### **1.5 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 Department Representative as failing to conform to Contract Documents. Replace or re execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.



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

## **1.6 REPORTS**

- .1 Submit 4 copies of inspection and test reports to Department Representative.
- .2 Provide copies to subcontractor of work being inspected or tested.

## **1.7 AND MIX DESIGNS**

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

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 INSTALLATION AND REMOVAL**

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Fence off with a minimum 1.8 m steel construction fence the project site and laydown for the duration of construction.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

### **1.2 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.

### **1.3 CONSTRUCTION PARKING**

- .1 Parking will only be in the laydown area or along the existing roadway.
- .2 Provide and maintain adequate access to project site.

### **1.4 SECURITY**

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

### **1.5 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.

### **1.6 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 Usage of recreational site sanitary facilities is not permitted.

### **1.7 CONSTRUCTION SIGNAGE**

- .1 Contractor to provide a site specific Traffic Accommodation Strategy. Department Representative will review and approve the Traffic Accommodation Strategy.

- .2 Provide and erect project signage as per Traffic Accommodation Strategy.
- .3 Direct requests for approval to erect Consultant/Contractor signboard to Department Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages(English and French).
- .4 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA Z321.
- .5 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.

## **1.8 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .2 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .3 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .4 Dust control: adequate to ensure safe operation at all times.

## **1.9 CLEAN-UP**

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

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

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

- .1 Department Representative will provide a site-specific erosion and sediment control plan (Appendix B).
- .2 Follow the erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

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

**END OF SECTION**

## **1 General**

### **1.1 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CGSB 1.59, Alkyd Exterior Gloss Enamel.
  - .2 CAN/CGSB 1.189-, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA O121 M1978(R2003), Douglas Fir Plywood.

### **1.2 INSTALLATION AND REMOVAL**

- .1 All work associated with this section is considered incidental to the work and will not be reimbursed separately.
- .2 Provide temporary controls in order to execute Work expeditiously.
- .3 Remove from site all such work after use.

### **1.3 FENCES AND BARRICADES**

- .1 Provide secure, rigid steel fences and barricades around deep excavations and work area. Fences will be minimum 1.8 m high minimum grid steel construction fence.
- .2 Provide as required by governing authorities.

### **1.4 DUST TIGHT SCREENS**

- .1 Provide dust screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

### **1.5 ACCESS TO SITE**

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

### **1.6 PUBLIC TRAFFIC FLOW**

- .1 Provide a Traffic Accommodation Strategy identifying public traffic flow.
- .2 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

### **1.7 FIRE ROUTES**

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.
- .2 Notify the local fire department in writing of any work on a fire route.

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**1.8 PROTECTION FOR OFF SITE AND PUBLIC PROPERTY**

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

**1.9 WASTE MANAGEMENT AND DISPOSAL**

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

**2 Products**

**2.1 NOT USED**

- .1 Not Used.

**3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 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 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 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.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Department Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions.

### **1.2 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 Department 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 Department Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Department Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

### **1.3 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 pipe on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Remove and replace damaged products at own expense and to satisfaction of Department Representative.

#### **1.4 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Department Representative. Unload, handle and store such products.

#### **1.5 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 Department Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Department Representative to require removal and re installation at no increase in Contract Price or Contract Time.

#### **1.6 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. Department 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 Department Representative, whose decision is final.

#### **1.7 CO ORDINATION**

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

#### **1.8 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.



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**2 Products**

**2.1 NOT USED**

.1 Not Used.

**3 Execution**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 RECORDS**

- .1 After award of the Contract, Department Representative will provide drawings for purpose of maintaining record drawings. During process of the work, accurately and neatly record deviations from Contract Documents caused by site conditions and changes ordered by Engineer.
- .2 Identified drawings as "Record Copy". Maintain in good condition, keep continuously updated and make available for inspection on site by Department Representative.
- .3 On completion of work and prior to final inspection, submit record documents including a final site survey in digital format to Department Representative. Department Representative will review and approve the record documents.

### **1.2 SUBSURFACE CONDITIONS**

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

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 SUBMITTALS**

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

### **1.2 MATERIALS**

- .1 Required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 Submittal Procedures.

### **1.3 PREPARATION**

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Maintain excavations free of water.

### **1.4 EXECUTION**

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Remove and replace defective and non conforming Work.
- .4 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .5 Restore work with new products in accordance with requirements of Contract Documents.

### **1.5 WASTE MANAGEMENT AND DISPOSAL**

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

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**3        Execution**

**3.1      NOT USED**

.1    Not Used.

**END OF SECTION**

## **1 General**

### **1.1 RELATED SECTIONS**

- .1 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **1.2 REFERENCES**

### **1.3 PROJECT CLEANLINESS**

- .1 All work included in this item is considered incidental to the Works and will not be reimbursed separately.
- .2 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .3 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Department Representative. Do not burn waste materials on site.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide onsite containers for collection of waste materials and debris.
- .6 Dispose of waste materials and debris off site or as directed by the Department Representative.
- .7 Promptly clean up any spillage that occurs on construction site, site roads, access roads or public roads, or other areas where construction vehicles are travelling. Notify Department Representative of any spillage occurred on site.
- .8 If Contractor is negligent in maintaining cleanliness on construction site, site roads, access roads or public roads, or other areas where construction vehicles are travelling, Department Representative will arrange for cleaning to be completed at Contractor's expense. The costs will be subtracted from final progress payment.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

### **1.4 FINAL CLEANING**

- .1 All work included in this item is considered incidental to the Works and will not be reimbursed separately.
- .2 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

- .4 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Department 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, fitments and equipment and ensure specified workmanship and operation.
- .8 Remove dirt and other disfiguration from exterior surfaces.
- .9 Sweep and wash clean paved areas.

## **1.5 WASTE MANAGEMENT AND DISPOSAL**

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

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **1        General**

### **1.1       WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Department Representative to review and discuss PWGSC's Waste Management Plan and Goals.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environment damage.

### **1.2       RELATED SECTIONS**

- .1 01 35 43 - Environmental Procedures.

### **1.3       DEFINITIONS**

- .1 Inert Fill: inert waste - exclusively asphalt and concrete.
- .2 Recyclable: ability of product or material to be recovered at end of its life cycle and re manufactured into new product for reuse.
- .3 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .4 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .5 Reuse: repeated use of product in same form but not necessarily for same purpose.  
Reuse includes:
  - .1 Salvaging reusable materials from re modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2 Returning reusable items including pallets or unused products to vendors.
- .6 Salvage: removal of structural and non structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .7 Separate Condition: refers to waste sorted into individual types.

### **1.4       MATERIALS SOURCE SEPARATION PROGRAM (MSSP)**

- .1 All work included in this item is considered incident to the Works and will not be reimbursed separately.
- .2 Provide on site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .3 Provide containers to deposit reusable and recyclable materials.
- .4 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .5 Locate separated material in area which minimize material damage.

- .6 Collect, handle, store on site, and transport off site, salvaged materials in separate condition.
  - .1 Transport to approved and authorized recycling facility.
- .7 Collect, handle, store on site, and transport off site, salvaged materials in combined condition.

## **1.5 WASTE PROCESSING SITES**

- .1 All waste, dumping and debris sites to be determined by Contractor and subject to approval by the Department Representative.

## **1.6 STORAGE, HANDLING AND PROTECTION**

- .1 All work included in this item is considered incidental to the Works and will not be reimbursed separately.
- .2 Store, materials to be reused, recycled and salvaged in locations as directed by Department Representative.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non salvageable materials from salvaged items. Transport and deliver non salvageable items to licensed disposal facility.
- .5 Protect surface drainage, mechanical and electrical from damage and blockage.
- .6 Separate and store materials produced during dismantling of structures in designated areas.
- .7 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

## **1.7 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste mineral spirits oil paint thinner into waterways, storm, or sanitary sewers.
- .3 Haul clean concrete materials outside of Jasper National Park. Contractor shall take possession of all unsuitable materials unless otherwise directed by Department Representative.
- .4 Haul asphalt materials outside of Jasper National Park. Contractor shall take possession of all unsuitable materials unless otherwise directed by Department Representative.
- .5 Haul unsuitable soil materials to Marmot Pit (20 km one-way from Mt. Edith Cavell Recreational Site) unless otherwise directed by Department Representative.
- .6 Deliver salvaged signs to Jasper Park Public Works yard unless otherwise directed by Department Representative.
- .7 Remove materials from deconstruction as deconstruction/disassembly Work progresses.



- .8 Prepare project summary to verify destination and quantities on a material by material basis as identified in pre demolition material audit.

## **1.8 USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises.

## **1.9 SCHEDULING**

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 APPLICATION**

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

### **3.2 CLEANING**

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

### **3.3 CLEAN UP WORK AREA AS WORK PROGRESSES.**

- .1 Source separate materials to be reused/recycled into specified sort areas.

**END OF SECTION**

## **1 General**

### **1.1 ADMINISTRATIVE REQUIREMENTS**

- .1 All work included in this section is considered incidental to the Works and will not be reimbursed separately.
- .2 Acceptance of Work Procedures:
  - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1 Notify Department Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - .2 Request Department Representative inspection.
  - .2 Department Representative Inspection:
    - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2 Contractor to correct Work as directed.
  - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
    - .1 Work: completed and inspected for compliance with Contract Documents.
    - .2 Defects: corrected and deficiencies completed.
    - .3 Work: complete and ready for final inspection.
  - .4 Final Inspection:
    - .1 When completion tasks are done, request final inspection of Work by Department Representative, and Contractor.
    - .2 When Work is incomplete according to Department Representative, complete outstanding items and request re-inspection.
  - .5 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

### **1.2 FINAL CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
  - .2 All disturbed areas including the lay-down yard shall be returned to their original condition.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**3 Execution**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 77 00 - Closeout Procedures.

### **1.2 AS BUILT DOCUMENTS AND SAMPLES**

- .1 All work included in this section is considered incidental to the Works and will not be reimbursed.
- .2 Maintain, in addition to requirements in General Requirements, at site for Department 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.
- .3 Store record documents and samples in field office apart from documents used for construction.
  - .1 Provide files, racks, and secure storage.
- .4 Label record documents and file in accordance with Section number listings in Table of Contents of the Contract Documents.
  - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .5 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .6 Keep record documents and samples available for inspection by Department Representative.

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

- .1 Record information on set of black line opaque drawings.
- .2 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .3 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Field changes of dimension and detail.
  - .2 Changes made by change orders.

- .3 Details not on original Contract Drawings.
- .4 References to related shop drawings and modifications.
- .5 Upon completion provide a copy of redline drawings showing all changes, additions, and deletions to the Department Representative.
- .4 Specifications: mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .5 Other Documents: maintain field test records, required by individual specifications sections.
- .6 Provide digital photos, if requested, for site records.
- .7 Submit AutoCadd Files with Geospatial Data which needs to be compatible with ArcGIS.

#### **1.4 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.

#### **1.5 WARRANTIES AND BONDS**

- .1 Warranty period of one (1) year from the date of substantial performance as determined by the Departmental Representative shall be applied for all items including but not limited to:
  - .1 Access Road.
  - .2 Parking Lot.
  - .3 Trails.
  - .4 Retaining Wall.
  - .5 All other project related items.
- .2 Warranty period of two (2) years from the date of Substantial Performance as determined by the Department Representative shall be applied for all items including but not limited to:
  - .1 Willow Staking.
  - .2 Trees (Engelmann Spruce and Lodgepole Pine).
  - .3 Maintenance of Invasives.
- .3 Unless otherwise specified, all materials incorporated into the work must be new and undamaged. Both workmanship and materials must be of the quality specified in the Contract Documents.
- .4 The Contractor shall maintain, at no cost to Parks Canada, the work and every part thereof in reasonable working order and complete repair during the period of one (1)

years from the date of written acceptance. Notwithstanding the generality of the foregoing, the Contractor will not be liable for:

- .1 Damage caused by parties who are strangers to the Contract, or
  - .2 Damage resulting from malicious acts of other parties, or
  - .3 Damage for which Parks Canada has specifically assumed responsibility in writing, or
  - .4 Any condition which in the opinion of the Departmental Representative results from normal wear and tear, or
  - .5 Acts or omissions which in the opinion of the Departmental Representative are beyond the control of the Contractor
  - .6 Where in each case the damage or condition arose subsequent to the issuance of acceptance of work.
- .5 The Contractor, upon being so directed by the Department Representative by a notice in writing during the maintenance period, shall repair or replace any defect in or failure of any part of the work within the time set out in and according to the notice, to the satisfaction of the Department Representative.
- .1 If the Contractor fails to repair or replace the defect or failures as required by any such notice, Parks Canada may proceed to have the repair or replacement made and may charge the Contractor with the cost thereof and at Parks Canada's option, deduct the amount from any amount due to the Contractor by Parks Canada either under the Contract or any other contract or otherwise or may collect the same from the Contractor by any lawful means available to Parks Canada.
  - .2 At the end of the maintenance period, after all defects and failures have been corrected to the satisfaction of the Department Representative, or if there are not any defects or failures in the work, the Department Representative will issue a written final acceptance.
- .6 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .7 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- .8 Verify that documents are in proper form, contain full information, and are notarized.
- .9 Co-execute submittals when required.
- .10 Retain warranties and bonds until time specified for submittal.
- .11 Except for items put into use with Department Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**3        Execution**

**3.1      NOT USED**

.1    Not Used.

**END OF SECTION**

## **1 General**

### **1.1 NOT USED**

- .1 Not Used.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Department Representative will provide a site specific erosion and sedimentation control plan (Appendix B).
  - .2 Follow the erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
  - .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Prior to beginning removal operation, inspect and verify with Department Representative areas, depths and lines of asphalt pavement to be removed.
- .3 Protection: protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Department Representative at no additional cost.

### **3.2 REMOVAL**

- .1 Remove existing asphalt pavement to limits indicated on the drawings and confirmed in the field.
- .2 Use equipment and methods of removal and hauling which do not damage pavement to remain in place.
- .3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.
- .4 Suppress dust generated by removal process.
- .5 Transport and stockpiled the removed asphalt pavement at the Marmot Pit. The pit is located on Hwy 93A approximately 20 km north of the project site near the intersection with the Icefield Parking Lot. Contractor to confirm location of the pit prior to submit the tender price.



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### **3.3      CLEANING**

- .1    Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .2    Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

## **1 General**

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

#### **.3 Canadian Environmental Protection Act, 1999 (CEPA 1999)**

- .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

#### **.4 Department of Justice Canada (Jus)**

- .1 Transportation of Dangerous Goods Act, 1992 (TDG Act), (c. 34).
- .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

#### **.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)**

- .1 Material Safety Data Sheets (MSDS).

#### **.6 National Research Council Canada Institute for Research in Construction (NRC-IRC)**

- .1 National Fire Code of Canada.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

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

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 All work included in this section is considered incidental to the Works and will not be reimbursed separately.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

- .4 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .5 Storage and Handling Requirements:
  - .1 Co-ordinate storage of hazardous materials with Department 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 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
    - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
    - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Department Representative.
  - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
  - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
  - .7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.
  - .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
  - .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
  - .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
    - .1 Store hazardous materials and wastes in closed and sealed containers.
    - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
    - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
    - .4 Segregate incompatible materials and wastes.
    - .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
    - .6 Store hazardous materials and wastes in secure storage area with controlled access.
    - .7 Maintain clear egress from storage area.
    - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

- .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 When hazardous waste is generated on site:
  - .1 Co-ordinate transportation and disposal with Department 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 containers 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 Department Representative.
  - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Department Representative.
  - .9 Report discharge, emission, or escape of hazardous materials immediately to Department Representative and appropriate provincial authority. Take reasonable measures to control release.
- .12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .13 Report spills or accidents immediately to Department Representative. Submit a written spill report to Department Representative within 24 hours of incident.

## **2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **3 Execution**

### **3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 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.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 03 30 00 - Cast In Place Concrete.
- .2 Section 01 74 11 - Cleaning

### **1.2 REFERENCES**

- .1 American Concrete Institute (ACI)
  - .1 SP-66-, ACI Detailing Manual 2004.
- .2 ASTM International
  - .1 ASTM A82/A82M-, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .2 ASTM A143/A143M-, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  - .3 ASTM A185/A185M-, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .4 ASTM A775/A775M , Standard Specification for Epoxy Coated Reinforcing Steel Bars.
- .3 CSA International
  - .1 CSA A23.1-/A23.2 , Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CAN/CSA A23.3 , Design of Concrete Structures.
  - .3 CSA G30.18 , Carbon Steel Bars for Concrete Reinforcement.
  - .4 CSA G40.20/G40.21 , General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .5 CAN/CSA G164 , Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .6 CSA W186 M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .4 Reinforcing Steel Institute of Canada (RSIC)
  - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Shop Drawings in accordance with 01 33 00:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Canada.
    - .1 Indicate placing of reinforcement and:
      - .1 Bar bending details.
      - .2 Lists.
      - .3 Quantities of reinforcement.
      - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Department Representative, with identifying code marks to permit correct placement without reference to structural drawings.
      - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.

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

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .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 and in accordance with manufacturer's recommendations .
  - .2 Replace defective or damaged materials with new.

## **2 Products**

### **2.1 MATERIALS**

- .1 Substitute different size bars only if permitted in writing by Department Representative.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA 30.18.
- .4 Cold drawn annealed steel wire ties: to CSA G30.3.
- .5 Deformed steel wire for concrete reinforcement: to CSA G30.14.
- .6 Welded steel wire fabric: to CSA G30.5.
- .7 Welded deformed steel wire fabric: to CSA G30.15.
- .8 Epoxy coating of non prestressed reinforcement: to ASTM A 775/A 775M.
- .9 Chairs, bolsters, bar supports, spacers: to CAN/CSA A23.1.
- .10 Mechanical splices: subject to approval of Engineer.

- .11 Plain round bars: to CAN/CSA G40.21.

## **2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Department Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Department Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

## **2.3 SOURCE QUALITY CONTROL**

- .1 Upon request, provide Department Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

## **3 Execution**

### **3.1 PREPARATION**

- .1 Galvanizing to include chromate treatment.
  - .1 Duration of treatment to be 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

### **3.2 FIELD BENDING**

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Engineer.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

### **3.3 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA A23.1/A23.2.
- .2 Use plain round bars as slip dowels in concrete.
  - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
  - .2 When paint is dry, apply thick even film of mineral lubricating grease.
- .3 Prior to placing concrete, obtain Department Representative's approval of reinforcing material and placement.



- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Protect epoxy coated portions of bars with covering during transportation and handling.

### **3.4 FIELD TOUCH UP**

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 03 20 00 - Concrete Reinforcement.

### **1.2 REFERENCES**

- .1 Reference Standards:
  - .1 ASTM International
    - .1 ASTM C260/C260M-, Standard Specification for Air-Entraining Admixtures for Concrete.
    - .2 ASTM C494/C494M , Standard Specification for Chemical Admixtures for Concrete.
    - .3 ASTM C1017/C1017M-, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - .2 CSA International
    - .1 CSA A23.1/A23.2 , Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
    - .2 CSA A283-, Qualification Code for Concrete Testing Laboratories.
    - .3 CSA A3000-, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 Submittal Procedures.
- .2 At least 4 weeks prior to beginning Work, provide Department Representative with samples of materials proposed for use as follows:
  - .1 Portland Cement.
  - .2 Supplementary cementing materials.
  - .3 Grout.
  - .4 Admixtures.
  - .5 Aggregates.

### **1.4 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 Deviations to be submitted for review by Department Representative  
Department Representative.
  - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

## **2 Products**

### **2.1 MATERIALS**

- .1 Portland cement: to CAN/CSA A3001 and NSF-61 where in direct contact with water.
- .2 Supplementary cementing materials: to CAN/CSA A3001 and NSF-61 certified.
- .3 Water: to CAN/CSA-A23.1.
- .4 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .5 Air entraining admixture: to ASTM C260 and NSF-61.
- .6 Chemical admixtures: to ASTM C494/494M or C1017 and NSF-61 certified.  
Department Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .7 Use of calcium chloride or admixtures containing calcium chloride is not permitted.
- .8 Shrinkage compensating grout pre-mixed compound consisting of non-metallic aggregate, Portland Cement water, reducing and plasterizing agents.
  - .1 Compressible Strength: 30 MPa in 28 days.
- .9 Concrete reinforcement: to Section 03 20 00 – Concrete Reinforcement.

### **2.2 CONCRETE MIXES**

- .1 Except where indicated or specified otherwise, provide concrete mix as follows:
  - .1 Cement: Type 50 Portland cement for surface and underground works.
  - .2 Minimum compressive strength at 28 days: 30 MPa.
  - .3 Minimum cement content: 315 kg/m<sup>3</sup> of concrete.
  - .4 Maximum size of coarse aggregate: 14 - 20 mm.
  - .5 Slump at time and point of discharge: 60 ± 80 mm.
  - .6 Air content: 5 to 8%.
  - .7 Maximum water cement ratio: 0.45.
  - .8 C-2 exposable classification for surface works to CSA-A23.1.
- .2 Do not change concrete mix without prior approval of the Department Representative. Should change in materials source be proposed, a new mix design to be approved by the Department Representative.
- .3 Concrete placed after September 30 shall attain the specified strength in 7 days.
- .4 The strength level of 30 MPa shall be considered to be achieved if the averages of all sets of 3 consecutive tests equal or exceed the specified strength and no individual strength test is more than 5 MPa below specified strength.

### **3 Execution**

#### **3.1 PREPARATION**

- .1 Obtain Department Representative's approval before placing concrete. Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete is permitted only after approval of equipment and mix.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Department Representative's approval of proposed method for protection of concrete during placing and curing .
- .7 Do not place concrete against any surfaces such as rebar, concrete or formwork that have a surface temperature of less than 5°C.
- .8 Consolidate concrete using internal vibrators. Use pencil vibrators where larger sizes are unsuitable.
- .9 Protect previous Work from staining.
- .10 Clean and remove stains prior to application for concrete finishes.
- .11 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

#### **3.2 INSTALLATION/APPLICATION**

- .1 Do cast in place concrete work to CSA A23.1/A23.2.
- .2 Finishing and curing:
  - .1 Finish concrete to CSA A23.1/A23.2.
  - .2 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

#### **3.3 SURFACE TOLERANCE**

- .1 tolerance to CSA A23.1 .

#### **3.4 FIELD QUALITY CONTROL**

- .1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control
  - .1 Concrete pours.
  - .2 Slump.
  - .3 Air content.

- .4 Compressive strength at 7 and 28 days.
- .2 Inspection and testing of concrete will be carried out by testing laboratory designated by mental Representative for review to CSA A23.1/A23.2.
- .3 Owner will pay for costs of tests.
- .4 Department Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.
- .6 Inspection or testing by Department Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

### **3.5 COLD WEATHER REQUIREMENTS**

- .1 When the at atmospheric temperature is lower than 5 degrees Celsius, all aggregates and water to preheated.
- .2 Contractor to hord concrete when the atmospheric temperature is lower than 5 degrees Celsius at not extra costs to the owner.
- .3 When depositing concrete at freezing or near freezing temperatures, the concrete shall have a temperature of between 10 and 30 degrees Celsius and shall be maintained at a temperature of at least 10 degrees Celsius.
- .4 If hot water is used in mixing, the water and aggregate shall be mixed for 1/2 minute prior to adding the cement.
- .5 If temperature of 10 degrees Celsius cannot be maintained for 3 days after placing, concrete placing shall cease.

### **3.6 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCES**

- .1 ASTM B209M-92a, Specification for Aluminium and Aluminium-Alloy Sheet and Plate.
- .2 CAN/CSA-G40.21-M92, Structural Quality Steels.
- .3 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 CGSB 1-GP-12c-65, Standard Paint Colours:
- .5 CAN/CGSB-1.104-M91, Semigloss Alkyd Air Drying and Baking Enamel.
- .6 CAN/CGSB-1.132-M90, Zinc Chromate Primer, Low Moisture Sensitivity.
- .7 CGSB 31-GP-101Ma-89, Chemical Conversion Films for Aluminium and Aluminium Alloys.
- .8 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing.
- .9 Manual of Uniform Traffic Control Devices for Canada (Fourth Edition) - Transportation Association of Canada.

## **2 Products**

### **2.1 MATERIALS**

- .1 Sign supports:
  - .1 Sign Supports:
  - .2 Timber posts:
    - .1 Sawn timber posts:
      - .1 Type: pressure treated.
      - .2 Dimensions: 4x4.
      - .3 CAN/CSA-Z809 or FSC or SFI certified.
    - .2 Posts to be treated in accordance with CAN/CSA O80 Series.
  - .3 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.
- .2 Signboards:
  - .1 Size of signs shall be as show on drawings:
    - .1 Aluminium sheet: to ASTM B209M, precut to required dimensions. Thickness to be 1.6 mm for signboards up to 750 mm wide.
    - .2 Silk Screen ink:
      - .1 Transparent or opaque colours: to CGSB 1-GP-12c, and as indicated.

- .3 Reflective sheeting and tape: to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.
- .4 Transparent tape: flexible, smooth-surfaced, moisture resistant tape with pressure sensitive adhesive.

## **2.2 FABRICATION**

- .1 Signboards.
  - .1 Aluminium blanks:
    - .1 Degrease, etch and bonderize with chemical conversion coating.
    - .2 Clean surfaces with xylene thinner. Dry.
    - .3 For non-reflective signs, spray face with one coat vinyl pretreatment coating and two finish coats of required colour.
    - .4 For aluminium signboards that are to be painted before installation, spray and bake face of signboards with two coats of enamel in accordance with CAN/CGSB-1.104.
  - .2 Reflective background sheeting and lettering:
    - .1 Cut and apply in accordance with manufacturer's instructions.
    - .2 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.
    - .3 Edge wrap sheeting on each extrusion prior to bolting extrusions. Match pieces of sheeting from different rolls for each signboard to ensure uniform appearance and brilliance by day and night.
    - .4 Reflective signboard faces may be prepared using silk screen transparent ink.
  - .3 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.

## **3 Execution**

### **3.1 INSTALLATION**

- .1 Sign support:
  - .1 Erect posts plumb and square to details as indicated.
  - .2 Telespar posts:
    - .1 Drill 200 mm diameter post hole to specified depth.
    - .2 Pour cast-in- place concrete base.
    - .3 Install anchor sleeve.
- .2 Signboard:
  - .1 Fasten signboards to supporting posts and brackets as indicated.
  - .2 Fasten lane markers to signboard.

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### **3.2 CORRECTING DEFECTS**

- .1 Correct defects, identified by Department Representative, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard angle for optimum performance during night conditions to approval of Department Representative.

### **3.3 CLEANING**

- .1 Deliver salvaged materials to Jasper National Park Public Works Yard.

### **3.4 PROTECTION**

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

**END OF SECTION**



## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 31 24 13 - Roadway Embankments.
- .2 Section 32 11 23 - Aggregate Base Courses.
- .3 Section 33 46 16 - Subgrade Drainage Network.

### **1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
  - .1 Submit 2 samples.
  - .2 Allow continual sampling by Department Representative during production.
  - .3 Provide Department Representative with access to source and processed material for sampling.
  - .4 Supply new or clean sample bags or containers of aggregate materials.
  - .5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

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

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.
- .3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

## **2 Products**

### **2.1 MATERIALS**

- .1 Type 1 Fill- Sub-Drain Bedding (Washed Rock):
  - .1 Clean, hard, durable, gravel or stone free from clay lumps, cementation, shale, organic material, frozen material and other deleterious materials.

- .2 Gradation to be within limits specified when tested to ASTM C136 and ASTM C117 giving smooth curve without sharp breaks when plotted on semi-log charts.

Sieve Designation	% Passing
50 000	100
25 000	80- 100
20 000	20- 100
5 000	0- 10

- .3 Compact pipe zone material to minimum 95 % Standard Proctor Density.

.2 Type 2 Fill (Imported Granular Material for Roadway, Parking Lot and Trail Embankment Construction)

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

- .2 Gradation to be within limits specified when tested to ASTM C136 and ASTM C117 giving smooth curve without sharp breaks when plotted on semi-log charts.

Sieve Designation	% Passing
25 000	100
20 000	82 - 97
16 000	70 - 94
10 000	52 - 79
5 000	35 - 64
1 250	18 - 43
630	12 - 34
315	8 - 26
160	5 - 18
80	2 - 10

- .3 Submit two samples for imported backfill material to the Department Representative review, prior to delivery on site.

- .4 A qualified material laboratory designated by the Owner will perform the sieve analysis of the submitted samples.

- .5 Compact import granular material to minimum 100 % Standard Proctor Density.

.3 Native Backfill (Common Excavation):

- .1 Selected material from excavation or other sources, approved by the Department Representative for use intended, unfrozen and free from rocks larger than 125 mm maximum particle size and 15% passing though the 80 micron sieve, cinders, ashes, sods, organics, refuse, or other deleterious materials.

- .2 Submit two samples for native material to the Department Representative for review.

- .3 A qualified material laboratory designated by the Owner will perform the sieve analysis of the submitted samples.

- .4 Compact native material to minimum 100 % Standard Proctor Density.

- .4 Granular Base Course (Road, Parking Lot, Trail):
- .1 Crushed stone or gravel consisting of hard, durable particles free from clay lumps, cementation, organic material, frozen material, or other deleterious materials.
  - .2 Gradation to be within limits specified when tested to ASTM C136 and ASTM C117 giving smooth curve without sharp breaks when plotted on semi-log charts.

Sieve Designation	% Passing
25 000	100
20 000	82 - 97
16 000	70 - 94
10 000	52 - 79
5 000	35 - 64
1 250	18 - 43
630	12 - 34
315	8 - 26
160	5 - 18
80	2 - 10

- .3 Submit two samples for granular base course material to the Department Representative review, prior to delivery on site.
  - .4 A qualified material testing laboratory designated by the Department Representative will perform the sieve analysis of the submitted samples.
  - .5 Granular Base: Refer to Section 32 11 23: Aggregates Base Courses.
  - .6 Compact granular base course to minimum 100% Standard Proctor Density.
- .5 Flat and elongated particles of coarse aggregate: to ASTM D4791.
- .1 Greatest dimension to exceed 5 times least dimension.
- .6 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
- .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
  - .2 Reclaimed asphalt pavement.
  - .3 Reclaimed concrete material.
- .7 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
- .1 Crushed rock.
  - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
  - .3 Light weight aggregate, including slag and expanded shale.

## 2.2 SOURCE QUALITY CONTROL

- .1 Inform Department Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise Department Representative 4 weeks minimum in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

### **3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions are acceptable for topsoil stripping.
  - .1 Visually inspect substrate in presence of Department Representative.
  - .2 Inform Department Representative of unacceptable conditions immediately upon discovery.

#### **3.2 PREPARATION**

- .1 Aggregate source preparation:
  - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials.
  - .2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
  - .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
  - .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water. Trim off and dress slopes of waste material piles and leave site in neat condition.
  - .5 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.
- .2 Processing:
  - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
  - .2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.
    - .1 Use methods and equipment approved in writing by Department Representative.
- .3 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

- .4 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
  - .1 Use only equipment approved in writing by Department Representative.
- .5 Stockpiling:
  - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Department Representative. Do not stockpile on completed pavement surfaces.
  - .2 Stockpile aggregates in sufficient quantities to meet project schedules.
  - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
  - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
  - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
  - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Department Representative within 48 hours of rejection.
  - .7 Uniformly spot dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
  - .8 Do not cone piles or spill material over edges of piles.
  - .9 Do not use conveying stackers.
  - .10 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed by Department Representative.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCES**

- .1 ASTM International
  - .1 ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN m/m ; ).
- .2 Canada Green Building Council (CaGBC)

### **1.2 EXISTING CONDITIONS**

- .1 Examine subsurface investigation report which is bound into specification following Section.
- .2 Locate underground and surface utility lines/structures and buried objects.

## **2 Products**

### **2.1 MATERIALS**

- .1 Fill material: in accordance with of Section 31 23 33.01 Excavating, Trenching and Backfilling.
- .2 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Department Representative.

## **3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Department Representative.
  - .2 Inform Department 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 Department Representative.

### **3.2 GRADING**

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Grade ditches to depth and cross sections as indicated.
- .3 Prior to placing fill over existing ground, scarify surface to depth of 150 mm minimum before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

- .4 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:
  - .1 95 % under landscaped areas.
  - .2 97 % under paved and gravelled areas up to 300 mm below final subgrade surface.
  - .3 100 % in final 300 mm pavement structure.
- .5 Do not disturb soil within branch spread of trees or shrubs to remain.

### **3.3 TESTING**

- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC. Costs of tests will be paid by Owner in accordance with Sections 01 29 83 Payment Procedures for Testing Laboratory Services and 01 45 00 Quality Control.

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.5 PROTECTION**

- .1 Protect and transplant existing trees, landscaping, natural features, , buildings, pavement, surface or underground utility lines which are to remain as directed by Department Representative . If damaged, restore to original or better condition unless directed otherwise.
- .2 Refer to section 01 35 43- Environmental Procedures for Site Specific Protection and Mitigation Measures.
- .3 Maintain access roads to prevent accumulation of construction related debris on roads.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCES**

#### **.1 Definitions:**

- .1 Rock: any solid material in excess of 1 m<sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m<sup>3</sup> bucket. Frozen material not classified as rock.
- .2 PPV: peak particle velocity.
- .3 Frozen material not classified as rock.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

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

#### **.2 Blasting Submittals: submit for approval, written proposal of operations for removal of rock by blasting to Department Representative.**

.1 Indicate proposed method of carrying out work types and quantities of explosives to be used, loading charts and drill hole patterns, type of caps, blasting techniques, blast protection measures for items such as flying rock, vibration, dust and noise control. Include details on protective measures, time of blasting and other pertinent details.

.2 Submit records to Department Representative at end of each shift. Maintain complete and accurate record of drilling and blasting operations.

#### **.3 Qualification Statements:**

- .1 Retain licensed explosives expert to program and supervise blasting work, to interpret recommendations of pre blasting report, and to determine precautions, preparation and operations techniques.
- .2 Submit documentation verifying explosives expert's qualifications.

### **1.3 DELIVERY, STORAGE AND HANDLING**

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

### **1.4 QUALITY ASSURANCE**

#### **.1 Blasting and Vibration Control:**

- .1 Reduce ground vibrations to avoid damage to structures or remaining rock mass.

## **2 Products**

### **2.1 NOT USED**

#### **.1 Not Used.**



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### **3 Execution**

#### **3.1 ROCK REMOVAL**

- .1 Perform excavation in accordance with Erosion and Sedimentation Control Plan (Appendix B).
- .2 Coordinate this Section with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Remove rock to alignments, profiles, and cross sections as indicated.
- .4 Explosive blasting to be approved by the Department Representative.
  - .1 Do blasting operations in accordance with local and provincial codes.
- .5 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.
- .6 Excavate trenches to lines and grades to minimum of 100 mm below pipe invert indicated. Provide recesses for bell and spigot pipe to ensure bearing will occur uniformly along barrel of pipe.
- .7 Cut trenches to widths as indicated.
- .8 Use pre shearing, cushion blasting or other smooth wall drilling and blasting techniques unless specified otherwise.
- .9 Remove boulders and fragments which may slide or roll into excavated areas.
- .10 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 Excavating, Trenching and Backfilling.

#### **3.2 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Rock Disposal:
  - .1 Dispose of removed rock off site.
  - .2 Do not dispose removed rock into landfill. Send material to appropriate location as approved by Department Representative.

#### **3.3 PROTECTION**

- .1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 Temporary Barriers and Enclosures. Erect fencing, post guards, sound warnings and display signs when blasting to take place.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 3543 - Environmental Procedures.
- .2 Section 31 05 16 - Aggregate General.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C117, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D422 63, Standard Test Method for Particle Size Analysis of Soils.
  - .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft lbf/ft ; ) (600 kN m/m ;).
  - .5 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft lbf/ft ; ) (2,700 kN m/m ;).
  - .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

### **1.3 DEFINITIONS**

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
  - .1 Rock: solid material in excess of 1.m<sup>3</sup>; and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m<sup>3</sup> bucket. Frozen material not classified as rock.
  - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
  - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
  - .1 Wet organic materials unsuitable for embankment construction.
  - .2 Weak, chemically unstable, and compressible materials.
  - .3 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422: Sieve sizes to CAN/CGSB 8.1.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

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

- .1 Quality Control: in accordance with Section 01 45 00 - Quality Control
- .2 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Inform Department Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
  - .3 Submit 25 kg samples of type of fill specified including representative samples of excavated material.
  - .4 Ship samples to Department Representative, in tightly closed containers to prevent contamination and exposure to elements.

#### **1.5 QUALITY ASSURANCE**

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .3 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered Province of Alberta, Canada.
- .4 Keep design and supporting data on site.
- .5 Engage services of qualified professional Engineer who is registered or licensed in Province of Alberta, Canada in which Work is to be carried out to design and inspect shoring and bracing required for Work.
- .6 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

#### **1.6 WASTE MANAGEMENT AND DISPOSAL**

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

- .2 Divert excess materials from landfill to local facility for reuse as directed by Department Representative.

## **1.7 EXISTING CONDITIONS**

- .1 Examine soil report available in Appendix D.
- .2 Buried services:
  - .1 Before commencing work verify location of buried services on and adjacent to site.
  - .2 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .3 Prior to beginning excavation Work, notify applicable Department Representative establish location and state of use of buried utilities and structures. Department Representative to clearly mark such locations to prevent disturbance during Work.
  - .4 Confirm locations of buried utilities by careful soil hydrovac methods, if required.
  - .5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.

## **2 Products**

### **2.1 MATERIALS**

- .1 Material used for embankment not to contain organic matter, frozen lumps, weeds, sod, roots, logs, stumps or any other objectionable matter.
- .2 Import Borrow Material: obtain from borrow pit approved by Department Representative.
- .3 Geotextiles: to Section 31 32 19.01 Geotextiles.

## **3 Execution**

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

- .1 Department Representative has developed a site specific erosion and sediment control plan. Refer to Appendix B.
- .2 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 sediment and erosion control plan.
- .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 SITE PREPARATION**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

### **3.3 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 Temporary Barriers and Enclosures and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Department Representative approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

### **3.4 STOCKPILING**

- .1 Stockpile fill materials in areas designated by Department Representative.
  - .1 Stockpile granular materials in manner to prevent segregation.
  - .2 Cover topsoil with heavy-duty plastic.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### **3.5 COFFERDAMS, SHORING, BRACING AND UNDERPINNING**

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements Health and Safety Act for the Province of Alberta.
  - .1 Where conditions are unstable, Department Representative to verify and advise methods.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .3 During backfill operation:
  - .1 Unless otherwise indicated or directed by Department Representative, remove sheeting and shoring from excavations.
  - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .4 Upon completion of substructure construction:
  - .1 Remove cofferdams, shoring and bracing.
  - .2 Remove excess materials from site and restore watercourses as directed by Department Representative .

### **3.6 DEWATERING AND HEAVE PREVENTION**

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

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

### **3.7 EXCAVATION**

- .1 Advise Department Representative at least 7 days in advance of excavation operations. Perform initial survey of the existing ground prior to excavation operations. Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .3 For trench excavation, unless otherwise authorized by Department Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Department Representative.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material at Marmot Pit or at location designated by the Department Representative.
- .7 Do not obstruct flow of surface drainage or natural watercourses. Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .8 Notify Department Representative when bottom of excavation is reached.
- .9 Obtain Department Representative approval of completed excavation.
- .10 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Department Representative.

- .11 Correct unauthorized over excavation as follows:
  - .1 Fill under other areas with Type 2 fill or Native Material compacted to not less than 97 % of corrected Standard Proctor maximum dry density Section 31 05 16-Aggregate Material.
- .12 Hand trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
  - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Department Representative.
- .13 Install geotextiles in accordance with Section 31 32 19.01 Geotextiles.

### **3.8 PIPE ZONE MATERIAL**

- .1 Place pipe zone material (Type 1 Fill) in accordance with details and as directed by Department Representative.
- .2 Place bedding and surround material in unfrozen condition.
- .3 Shape bed true to grade and provide continues, uniform bearing surface for barrel of pipe. Do not use blocks when bedding pipe.
- .4 Shape traverse depressions are required to receive bell, if bell and spigot pipe is used.
- .5 Compact full of bed to 95 % Standard Proctor Density.

### **3.9 BACKFILLING**

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Department Representative has inspected and approved installations.
  - .2 Department Representative has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
  - .4 Removal of concrete formwork.
  - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast in place concrete within 24 hours after placing of concrete.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading.

- .6 Place fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Install drainage system in backfill as indicated.

### **3.10 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Department Representative.
- .2 Restore site per the Restoration Plan (Appendix C).
- .3 Reinstate areas in accordance to Section 01 35 43 Environmental Procedures.
- .4 Reinstate pavements disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstate area affected by Work as directed by Department Representative.
- .6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.
- .7 Clean and reinstate areas affected by Work as directed by Department Representative.
- .8 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**



## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 45 00 - Quality Control.
- .2 Section 31 05 16 - Aggregate General.

### **1.2 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 Stripping: excavation of organic material covering original ground.
  - .4 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.
  - .5 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.
  - .6 Borrow Material: material obtained from areas outside right of way and required for construction of embankments or for other portions of work.
  - .7 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 D698 , Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft lbf/ft;) (600 kN m/m;).
  - .2 American Association of State Highway and Transportation Officials (AASHTO)
    - .1 AASHTO T99-10, Standard Method of test for Moisture-Density Relations of Soils Using a 2.5 kg (5.5lb) Rammer and 305 mm (12 in) Drop.

## **2 Products**

### **2.1 MATERIALS**

- .1 Embankment materials require approval by Department Representative.
- .2 Use portion of the temporary berm material found on site for embankment construction.

- .3 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.
- .4 Borrow material:
  - .1 Obtain from sources such as quarry, or borrow pit as approved by Department 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 Rock Embankment material to consist of fragmented rock produced by drilling and blasting operations, and boulders which cannot be placed in layers as specified for Earth Embankments.

### **3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that condition of substrate is acceptable for roadway embankment Work:
  - .1 Visually inspect substrate in presence of Department Representative.
  - .2 Inform Department 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 Department Representative.

#### **3.2 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.

#### **3.3 WATER DISTRIBUTORS**

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

#### **3.4 EXCAVATING**

- .1 General:
  - .1 Notify Department Representative when waste materials are encountered and remove to depth and extent directed.

- .2 Sub-excavate 200 mm below subgrade in cut sections unless otherwise directed by Department Representative.
  - .1 Compact top 150 mm below sub-excavate to minimum 95% maximum dry density, to ASTM D698.
  - .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 as directed by Department Representative.
  - .4 Treat ground slopes, where subgrade is on transition from excavation to embankment, at grade points as directed by Department Representative.
- .2 Drainage:
  - .1 Maintain profiles, crowns and cross slopes to provide good surface drainage.
  - .2 Provide ditches as work progresses to provide drainage.
  - .3 Construct interceptor ditches as indicated or as directed before excavating or placing embankment in adjacent area.
  - .4 Contractor is responsible for site dewatering during construction regardless of original water coming into site.
- .3 Rock excavation:
  - .1 Refer to section 31 23 33.26 – Rock Removal
  - .2 Notify Department Representative, when material appearing to conform to classification for rock is encountered, to enable measurements to be made to determine volume of rock. Provide 24 hour notification.
  - .3 Submit blasting program to Department Representative, for approval 48 hours minimum before start of Work.
    - .1 Do not proceed without written approval of blasting program from Department Representative.
  - .4 Shatter rock to 150 mm below subgrade elevation as indicated.
  - .5 Reduce over break and increase stability of rock faces by using smooth blasting techniques.
  - .6 Use smooth blast and excavate short sections in rock cuts to determine optimum spacing of holes when requested by Department Representative.
  - .7 Stem holes as necessary to contain blast. Do not use prilled type ammonium nitrate and fuel oil (ANFO) explosives within 4 m of final cut line.
  - .8 Form back wall by pre splitting at least 10 m in advance of production blasting.
    - .1 Smooth wall blast just prior to or just after production blast as determined by approved blast program.
  - .9 Scale rock back slopes to achieve smooth, stable face, free of loose rock and overhangs to design back slope.
  - .10 Control blasting to minimize flying particles.

.4 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 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 Slope edges of borrow areas to minimum 2:1 and provide drainage as directed.
- .4 Trim and leave borrow pits in condition to permit accurate measurement of material removed.

**3.5 EMBANKMENTS**

- .1 Key-into the existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.
  - .1 See standard detail in the construction drawings.
- .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 by Department Representative.
- .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. Department 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 1 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.
  - .4 Do not place boulders and rock fragments with dimensions exceeding 150 mm of subgrade elevation.
- .7 Deductions from excavation will be made for overbuild of embankments.

**3.6 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 200 mm 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 Use specialized compaction equipment supplemented by routing, hauling, and leveling equipment over each layer of fill.
- .4 Obtain written approval from Department Representative before using specialized compaction equipment such as tamping rollers, vibratory rollers, or other alternate compaction equipment that produces the required results
  - .1 For tamping rollers, use equipment that exerts 1000 kPa minimum of pressure on tamping surface of each tamping foot in transverse row.
- .5 Compact each layer to minimum 100% maximum dry density: ASTM D698
- .6 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

### **3.7 FINISHING**

- .1 Shape entire roadbed to within 50 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 steeper than 1:1.
- .3 Remove rocks over 150 mm in dimension from slopes and ditch bottoms.
- .4 Hand finish slopes that cannot be finished satisfactorily by machine.
- .5 Round top of back slope 1.5 m both sides of top of slope.
- .6 Run tractor tracks over slopes exceeding 3 m in height to leave tracks parallel to centerline of highway.
- .7 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags and ruts.

### **3.8 CLEANING**

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

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 33 46 16 - Subgrade Drainage Network.
- .2 Section 31 37 70 - Rip Rap.
- .3 Section 31 24 13 Roadway Embankments.

### **1.2 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

## **2 Products**

### **2.1 MATERIAL**

- .1 Geotextile: non woven synthetic fiber fabric, supplied in rolls.
- .2 Non-woven geotextile includes:
  - .1 Continues monofilaments or staple fibers.
  - .2 Random fibers that are physically entangled by punching with needles.
  - .3 Random fibers that are pressed and melted together at the contact points.
- .3 The non-woven geotextile fabric shall meet the following requirements:

Property	Material Specification Average Roll Value
	Type B
Grab tensile Strength (N)	650 min
Grab Tensile Elongation (%)	50% min
Mullen burst (MPa)	2.1 min
Puncture (N)	275 min
Trapezoid Tear (N)	250 min
Ultraviolet Stability (% Retained Strength)	70% @ 150 hr
Apparent Opening Size (mm)	0.2 max
Permittivity (per sec)	1.5 min
Flow Rate (l/sec/m <sup>2</sup> )	102 min

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### **3 Execution**

#### **3.1 INSTALLATION**

- .1 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .2 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .3 Overlap each successive strip of geotextile 300 mm over previously laid strip.
- .4 Join successive strips of geotextile by sewing.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 4 hours of placement.
- .7 Replace damaged or deteriorated geotextile to approval of Department Representative.
- .8 Place and compact soil layers in accordance with Section 31 24 13 Roadway Embankments - Trenching and Backfill also.

#### **3.2 PROTECTION**

- .1 Vehicular traffic not permitted directly on geotextile.

**END OF SECTION**



## **1 General**

### **1.1 DESCRIPTION**

- .1 The Work on this Section consists of design, supply, fabrication, delivery and installation of gabion basket wall.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM A313/A313M-98, Standard Specification for Stainless Steel Spring Wire.
  - .2 ASTM A764-95(2001), Standard Specification for Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size For Mechanical Springs.
- .2 Canadian Standards Association (CSA)
  - .1 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 11 - Cleaning.
- .2 Collect and separate plastic, paper packaging, and/or corrugated cardboard in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Fold up metal banding, flatten and place in designated area for recycling.
- .5 Divert left over aggregate material from landfill to a local facility as approved by Departmental Representative.
- .6 Divert left over metal materials to a local recycling facility as approved by Departmental Representative.
- .7 Divert left over geotextiles from landfill to a local plastic recycling facility as approved by Departmental Representative.

### **1.4 DESIGN SUBMITTALS**

- .1 Shop drawings shall be stamped, signed and sealed by a Professional Engineer, registered to practice in the Province of Alberta.

## **2 Products**

### **2.1 MATERIALS**

- .1 Gabion baskets:
  - .1 Factory fabricated so that sides, ends, lid and internal diaphragms can be readily assembled at site into rectangular baskets of sizes as indicated.
  - .2 Single unit construction or with joints having strength and flexibility equal to that of mesh.
  - .3 Provide diaphragms of same mesh as gabion walls, when length exceeds horizontal width. Diaphragms to divide basket into equal cells of length not to exceed horizontal width.
  - .4 Wire mesh gabions:
    - .1 Wire mesh: uniform hexagonal pattern wire woven in triple twist pattern with openings of approximately 80 x 100 mm, non-ravelling.
    - .2 Securely selvedge perimeter edges to form joints connecting selvedges with same strength as mesh body.
    - .3 Wire to have following dimensions:
      - .1 Mesh: PVC covered wire 2.4 mm diameter.
      - .2 Selvedges: PVC covered wire 3.4 mm diameter.
      - .3 Binding: 2.0 mm diameter.
    - .4 Wire: hot dip galvanized with minimum coverage of 260 g/m<sup>2</sup> to CAN/CSA G164. Cover with minimum 0.5 mm thick polyvinyl chloride coating.
    - .5 Interlocking wire fasteners: galvanized steel to ASTM A764, finish 1, class 1, type 3.
- .2 Stone fill:
  - .1 Hard, durable, abrasion resistant, capable of resisting degradation from action of wetting and drying, wave action, freezing and thawing cycles.
  - .2 Minimum 80 mm to maximum 200 mm dimension for individual stones.
- .3 Geotextile filter: in accordance with Section 31 32 19.01 - Geotextiles.

## **3 Execution**

### **3.1 INSTALLATION**

- .1 Install gabions and geotextiles to lines and grades as indicated. Follow manufacturer's instructions in assembling baskets.
- .2 Excavate for and backfill behind gabions in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.

### **3.2 PLACING GABIONS**

- .1 Wherever possible, place baskets in position prior to filling with stones.

- .2 Join adjacent baskets together at corners as recommended by manufacturer, to ensure joints are as strong as mesh.

### **3.3 FILLING BASKETS**

- .1 On exposed faces of gabions, place stones by hand with flattest surfaces bearing against face mesh to produce satisfactory alignment and appearance.
- .2 For wire mesh gabions, fill gabion cells in lifts not to exceed 300 mm and connect opposite walls with two tie wires after each lift.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 00 11 00 - Summary of Work.

### **1.2 REFERENCES**

- .1 Alberta Transportation: Unless otherwise specified in this specification, the rip Rap shall conform to the requirements of the Alberta Transportation - Standard Specification for Bridge Construction, May 2013, Section 10 - Heavy Rock Rip Rap.

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Cleaning.
- .2 Divert left over geotextiles to local plastic recycling facility as approved by Department Representative.

## **2 Products**

### **2.1 STONE**

- .1 Hard, dense, with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
  - .1 Rip Rap Class: 1.
    - .1 Following Gradation shall be satisfied:

Nominal Mass (Kg)	40
Nominal Diameter (mm)	300
None greater than (Kg or mm)	130 or 450
20% to 50% (Kg or mm)	70 or 350
50% to 80% (Kg or mm)	40 or 300
100% (Kg or mm)	10 or 200
    - .2 Rip Rap Class: 2.
      - .1 Following Gradation shall be satisfied:

Nominal Mass (Kg)	200
Nominal Diameter (mm)	500
None greater than (Kg or mm)	700 or 800
20% to 50% (Kg or mm)	300 or 600
50% to 80% (Kg or mm)	200 or 500
100% (Kg or mm)	40 or 300
  - .2 Riprap shall consist of a graded mixture of sound, durable stone having no greater average dimension indicated.

- .3 Riprap shall not contain soil clods, topsoil, root and other organic matter and shale fragments.
- .4 Riprap shall be resistant to weathering and water action.

## **2.2 GEOTEXTILE**

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
- .2 Refer to section 31 32 19.01 – Geotextiles.

## **3 Execution**

### **3.1 PLACING**

- .1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .3 Place geotextile on prepared surface, free of protruding or sharp objects. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .4 Place rip-rap to thickness and details as shown on the drawings.
- .5 Place stones in manner approved by Department Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 35 43 Environmental Procedures
- .2 Section 01 56 00 Temporary Barriers and Enclosures
- .3 Section 32 93 10 Tree, Shrub, and Groundcover Planting

### **1.2 REFERENCES**

- .1 Refer to and perform work in accordance with the “Edith Cavell Rehabilitation Basic Impact Analysis” supplied in Appendix A.
- .2 Refer to and perform work in accordance with “Edith Cavell Rehabilitation Restoration Plan” supplied in Appendix C.
- .3 Health Canada - Pest Management Regulatory Agency (PMRA)
  - .1 National Standard for Pesticide Education, Training and Certification in Canada (1995).
- .4 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
  - .2 Fertilizers Act (R.S. 1985, c. F-10).
  - .3 Fertilizers Regulations (C.R.C., c. 666).

### **1.3 ACTION AND INFORMATION SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 – Submittals.
- .2 Submit monthly written reports on maintenance during warranty period, to Department Representative identifying:
  - .1 Maintenance work carried out.
  - .2 Development and condition of plant material.
  - .3 Preventative or corrective measures required which are outside Contractor’s responsibility.

### **1.4 SCHEDULING**

- .1 Obtain approval from Department Representative of schedule indicating beginning of work.

## **2 Products**

### **2.1 MATERIALS**

- .1 Fill:
  - .1 Excavated soil, free from roots, rocks larger than 75 mm, and toxic ingredients (salt, oil, etc). Excavated material shall be approved by Department Representative before use as fill.
- .2 Snow fencing: 38 x 38mm mesh x 2400mm high, orange plastic.
- .3 T bar, steel, 40 x 40mm, length to suit. Spacing to be max. 2m.

## **3 Execution**

### **3.1 IDENTIFICATION AND PROTECTION**

- .1 Identify plants and limits of root systems to be preserved as approved by Department Representative.
- .2 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by Department Representative.
- .3 The Department Representative shall identify a Tree Protection Zone (TPZ) that shall be barricaded to the satisfaction of the Department Representative. Generally, the TPZ shall not be less than the drip line of the tree/shrub as per Department Representative's direction on site. The final area of the TPZ shall be to the satisfaction of the Department Representative.
- .4 No equipment or storing of materials is allowed within the TPZ unless directed by the Department Representative.
- .5 The Department Representative reserves the right to direct Contractor activity within the TPZ with appropriate mitigative measures, including spreading of topsoil or placement of plywood to spread loading. Mitigative measures shall be undertaken by the Contractor at no additional cost to the Owner.
- .6 Ensure no root pruning is done inside drip line unless directed by the Department Representative.

### **3.2 EXCAVATION NEAR TREES**

- .1 Identify limits for required construction excavation as approved by Department Representative.
- .2 The Department Representative shall be present during excavation operations.

- .3 Excavation within 2m of trees.
  - .1 Prior to construction excavation, cut roots with a sharp axe or saw in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .4 Excavations beyond 2m of trees.
  - .1 Trenching not required. Immediately after excavation, prune all tree roots.
- .5 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.
- .6 Place a tarpaulin over excavation wall to prevent exposed roots from drying out.
- .7 Backfill around tree roots as soon as possible.
- .8 Erect hoarding as follows:
  - .1 Snow fence beyond dripline of vegetation to satisfaction of Department Representative.
- .9 Water plants sufficiently during construction to maintain optimum soil moisture condition until backfill operations are complete.

### **3.3 LOWERING GRADE AROUND EXISTING TREE**

- .1 Begin Work in accordance with schedule approved by Department Representative.
- .2 Cut slope not less than 500mm from tree trunk to new grade level.
- .3 Excavate to depths as indicated. Protect root zone designated to remain from damage.
- .4 When severing roots at excavation level, cut roots with a sharp axe or saw in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .5 Cultivate excavated surface manually to 15mm depth.
- .6 Place locally sourced topsoil over area of excavation to finished grade level.
- .7 Water entire root zone to optimum soil moisture level.
- .8 Install surface cover of topsoil and coarse woody debris in accordance with Section 32 91 19.13.

### **3.4 CLOSEOUT**

- .1 Remove hoarding only following completion of construction or as directed by the Department Representative.

**END OF SECTION**



## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 31 05 16 - Aggregate General.

### **1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM C117 04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C131, Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft lbf/ft;) (600kN m/m;).
  - .5 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft;) (2,700kN m/m;).
  - .6 ASTM D1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 8.1, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB 8.2, Sieves, Testing, Woven Wire, Metric.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

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

- .1 Deliver, store and handle materials in accordance with Section 31 05 16 - Aggregate Materials.

## **2 Products**

### **2.1 MATERIALS**

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

## **3 Execution**

### **3.1 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Department Representative has provided a site specific erosion and sedimentation control plan in Appendix B.
  - .2 Follow the erosion and sediment control measures to prevent soil erosion and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways.
  - .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 PLACEMENT AND INSTALLATION**

- .1 Place granular base after subgrade surface is inspected and approved in writing by Department Representative.
- .2 Placing:
  - .1 Construct granular base to depth and grade in areas indicated.
  - .2 Ensure no frozen material is placed.
  - .3 Place material only on clean unfrozen surface, free from snow and ice.
  - .4 Place material to full width in uniform layers not exceeding 100mm compacted thickness.
  - .5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
  - .6 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment:
  - .1 Ensure compaction equipment is capable of obtaining required material densities.
- .4 Compacting:
  - .1 Compact to density not less than 100% maximum dry density to ASTM D698.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Department Representative.

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

.5 Proof rolling:

.1 For proof rolling use fully loaded tandem truck.

.2 Proof roll at level in granular base as indicated.

.1 If use of non-standard proof rolling equipment is approved, Department Representative to determine level of proof rolling.

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

.4 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, subgrade material to depth and extent as directed by Department Representative.

.2 Replace base material and compact in accordance with this Section.

### **3.3 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.

### **3.4 PROTECTION**

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

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 32 12 16 - Asphalt Paving.

### **1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM D140/D140M-, Standard Practice for Sampling Bituminous Materials.
  - .2 ASTM D633-, Standard Volume Correction Table for Road Tar.
  - .3 ASTM D1250-, Standard Guide for Use of the Petroleum Measurement Tables.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Samples:
  - .1 Sample asphalt tack coat material to: ASTM D140.
  - .2 Access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work to ASTM D140.

### **1.4 QUALITY ASSURANCE**

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

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

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Deliver, store and handle materials in accordance with ASTM D140.

## **2 Products**

### **2.1 MATERIALS**

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

### **2.2 EQUIPMENT**

- .1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.
- .2 Pressure distributor:
  - .1 Designed, equipped, maintained and operated so that asphalt material can be:
    - .1 Maintained at even temperature.
    - .2 Applied uniformly on variable widths of surface up to 5 m.

- .3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m<sup>5</sup> with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m<sup>2</sup>.
- .4 Distribute in uniform spray without atomization at temperature required.
- .2 Equipped with meter, registering travel in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
- .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
- .4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
- .1 Measure temperature to closest whole number.
- .5 Equipped with accurate volume measuring device or calibrated tank.
- .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
- .7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered. Cleaned if previously used with incompatible asphalt material.

### **3 Execution**

#### **3.1 APPLICATION**

- .1 Apply asphalt tack coat only on clean and dry surface.
- .2 Dilute asphalt emulsion with water at 1:1 ratio for application.
  - .1 Mix thoroughly by pumping or other method approved by Departmental Representative.
- .3 Apply asphalt tack coat evenly to pavement surface.
- .4 Apply asphalt tack coat only when air temperature greater than 10 degrees Celsius and when rain is not forecast within 2 hours minimum of application.
- .5 Apply asphalt tack coat only on unfrozen surface.
- .6 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .7 Re tack contaminated or disturbed areas as directed by Departmental Representative.
- .8 Permit asphalt tack coat to set before placing asphalt pavement.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 32 12 16 – Asphalt Paving
- .2 ASTM International
  - .1 ASTM D140/D140M, Standard Practice for Sampling Bituminous Materials.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-16.1, Cutback Asphalts for Road Purposes.
  - .2 CAN/CGSB-16.2, Emulsified Asphalts, Anionic Type, for Road Purposes.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Upon request from Department Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .1 Arrange points of delivery and quantity to be shipped with vendor
  - .2 Make deliveries during normal work hours.
  - .3 Include copy of orders and instructions respecting shipment upon request by Department Representative.
  - .4 Include suitable unloading facilities and unload asphalt as directed Department Representative.
  - .5 Provide, maintain and restore asphalt storage area.
- .3 Storage and Handling Requirements:
  - .1 Deliver, store and handle materials to ASTM D140.
  - .2 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .3 Replace defective or damaged materials with new.

## **2 Products**

### **2.1 MATERIAL**

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

## **2.2 EQUIPMENT**

- .1 Pressure distributor:
  - .1 Designed, equipped, maintained and operated so that asphalt material can be:
    - .1 Maintained at even temperature.
    - .2 Applied uniformly on variable widths of surface up to 4 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 travel distance in meters per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
  - .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator.
    - .1 Pump power unit to be independent of truck power unit.
  - .4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
    - .1 Temperature to be measured to nearest whole number.
  - .5 Equipped with accurate volume measuring device or calibrated tank.
  - .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
  - .7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered.
  - .8 Cleaned if previously used with incompatible asphalt material.
- .2 Aggregate Spreader:
  - .1 Apply blotter sand to primed surfaces using roll type spreader, or rotating disc sander capable of applying aggregate at variable widths and at variable rates.

## **3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt prime coat installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Department Representative.
  - .2 Inform Department Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

### **3.2 APPLICATION**

- .1 Proceed with application of prime coat only after receipt of written approval of granular base surface from Department Representative.
  - .1 Heat asphalt prime to temperature range specified by the Supplier for pumping and spraying.
  - .2 Apply asphalt prime to granular base at rate as agreed upon by the Contractor and the Department Representative at the beginning of the project to ensure complete and uniform coverage without streaking.
  - .3 Apply on dry surface unless otherwise directed by Department Representative.
- .2 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 Department Representative.
  - .3 Apply diluted asphalt emulsion at rate directed by Department Representative.
  - .4 Apply diluted asphalt emulsion on damp surface unless otherwise directed by Department Representative.
- .3 Apply asphalt prime only on unfrozen surface.
- .4 Apply asphalt prime coat only when air temperature is greater than 5 degrees Celsius and when rain is not forecast within 2 hours minimum of application.
- .5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt prime material.
- .6 Where traffic is to be maintained, treat no more than one-half width of surface in one application.
- .7 Prevent overlap at junction of applications.
- .8 Do not prime surfaces that will be visible when paving is complete. Remove excess immediately.
- .9 Apply additional material to areas not sufficiently covered as directed by Department Representative.
- .10 Keep traffic off primed areas until asphalt prime has cured.
- .11 Permit prime to cure before placing asphalt paving.

### **3.3 USE OF SAND BLOTTER**

- .1 If asphalt prime fails to penetrate within 24 hours, spread sand blotter material in amounts required to absorb excess material.
- .2 Allow sufficient time for excess prime to be absorbed as directed by Department Representative.
- .3 Apply second application of sand blotter as required.
- .4 Do not roll blotter sand.



- .5 Sweep and remove excess blotter material.

### **3.4 CLEANING**

- .1 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 Ensure surfaces not meant to be primed are cleaned immediately.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures.

### **1.2 REFERENCES**

- .1 American Association of State Highway and Transportation Officials (AASHTO)
  - .1 AASHTO M320, Standard Specification for Performance Graded Asphalt Binder.
  - .2 AASHTO R29, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
  - .3 AASHTO T245, Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
- .2 Asphalt Institute (AI)
  - .1 AI MS-2, Mix Design Methods for Asphalt Concrete and Other Hot Mix Types. ASTM International
  - .2 ASTM C88 05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .3 ASTM C117, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .4 ASTM C123, Standard Test Method for Lightweight Particles in Aggregate.
  - .5 ASTM C127, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
  - .6 ASTM C128, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
  - .7 ASTM C131, Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .8 ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .9 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.
  - .10 ASTM D995, Standard Specification for Mixing Plants for Hot Mixed, Hot Laid Bituminous Paving Mixtures.
  - .11 ASTM D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
  - .12 ASTM D3203, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
  - .13 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 8.1, Sieves Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB 8.2, Sieves Testing, Woven Wire, Metric.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials and erosion and sedimentation control plan.
- .3 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .4 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.
- .5 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

## **2 Products**

### **2.1 MATERIALS**

- .1 Performance graded asphalt cement: Type M1 to AASHTO M320, Grade PG 52-34 when tested to AASHTO R29.
- .2 Aggregates: in accordance with requirements as follows:
  - .1 Crushed stone or gravel.
  - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117.
  - .3 Table:

<u>Designation (mm)</u>	<u>Percent Passing (mm)</u>
12,500	100
10,000	83-92
8,000	
5,000	55-70
1,250	26-45
630	18-38
315	12-30
160	8-20
80	4-10

- .4 Aggregate Production:
  - .1 The Contractor shall split aggregates for above specified material into coarse and fine fractions
  - .2 Prior to crushing of the coarse fraction. The crushed coarse and the fine fractions shall be stockpiled separately.
  - .3 The Contractor shall select a screen size at which splitting will take place. Splitting of aggregates shall be controlled such that the coarse aggregate fraction, before crushing, shall contain no more than 5% passing the 5000 sieve for all mix types.
  - .4 All uncrushed fine fraction(s) shall contain no more than 20% of material retained on the 5000 sieve size.

- .5 Further splitting of the crushed coarse aggregate into separate stockpiles may be performed at the Contractor's option. No additional payment will be made for this work.
- .5 Production and addition of Blend Sand:
  - .1 When the aggregate being produced is destined for further processing through a mixing plant, the addition of any required blend sand shall take place at the mixing plant.
  - .2 Prior to the mix production, blend sand shall be separately stockpiled so that a representative sample can be obtained in order to establish a mix design.
  - .3 All blend sand shall be screened before being incorporated into the mix, to remove clay lumps, roots and other deleterious materials. All blend sand so screened shall pass the 5 000 sieve.
  - .4 Blend sand shall be dried if necessary to ensure a uniform feed.
  - .5 All other aggregates requiring an addition of blend sand to meet the gradation requirements shall be adjusted at the crushing stage by means of a separate conveyor or other approved device capable of metering the blend sand at a specified uniform rate. The blend sand shall beaded prior to or onto the crusher screen deck.
- .6 Production of Extra Manufactured Fines
  - .1 Manufactured fines are defined as that portion of the material passing the 5 000 sieve size which is produced by the crushing process.
  - .2 In the event the manufactured fines in the total combined aggregate do not meet the requirement for the specified Asphalt Concrete Mix Type, extra manufactured fines shall be produced by screening the pit-run material so that the screened material contains no more than 5% material passing a 5 000 sieve. This material shall be crushed and all material produced by this crushing process shall be placed in a separate stockpile and designated as Extra.

## **2.2 EQUIPMENT**

- .1 Pavers: mechanical grade controlled self powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
  - .1 Drum diameter: 1200 mm minimum.
  - .2 Follow the manufacturer's recommended operation procedure.

- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
  - .1 Boxes with tight metal bottoms.
  - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
  - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
  - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Hand tools:
  - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
  - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm<sup>2</sup> for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Department Representative, may be used instead of tamping irons.
  - .3 Straight edges, 3 m in length, to test finished surface.

## 2.3 MIX DESIGN

- .1 Mix Design and Job Mix Formula
  - .1 Engage a qualified testing laboratory to prepare a mix design and job mix formula for aggregate. The mix design and job mix formula shall be submitted and receive the Department Representative approval prior to paving.
- .2 Design of mix: by Marshall method to requirements below and as directed by Department Representative.
- .3 Mix Properties:

	<u>M1</u>
Max size of aggregate (µm)	12,500
No. of Blows (each end of specimen)	75
Stability (K <sub>n</sub> ) (min.)	8.0
Flow (mm)	2 - 3.5
% Air Voids in Total Mix	3.5 - 4
% Retained Stability	70
Minimum Film Thickness	6.0

- .1 Measure physical requirements as follows:
  - .1 Marshall load and flow value: to AASHTO T245.
  - .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
  - .3 Air voids: to ASTM D3203.

.2 Do not change job mix without prior approval of Department Representative. When change in material source proposed, new job mix formula to be approved by Department Representative.

.3 Return plant dust collected during processing to mix in quantities acceptable to Department Representative.

### **3 Execution**

#### **3.1 EXAMINATION**

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

.1 Visually inspect substrate in presence of Department Representative.

.2 Inform Department 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 Department Representative.

#### **3.2 PLANT AND MIXING REQUIREMENTS**

.1 Batch and continuous mixing plants:

.1 To ASTM D995.

.2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.

.1 Do not load frozen materials into bins.

.3 Feed cold aggregates to plant in proportions to ensure continuous operations.

.4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.5 Before mixing, dry aggregates to moisture content not greater than 1% by mass or to lesser moisture content if required to meet mix design requirements.

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

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

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

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

.10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.

.11 Mixing time:

- .1 In batch plants, both dry and wet mixing times as directed by Department Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.
- .2 In continuous mixing plants, mixing time as directed by Department Representative but not less than 45s.

.2 Dryer drum mixing plant:

- .1 To ASTM D995.
- .2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
- .3 Feed aggregates to burner end of dryer drum by means of multi bin cold feed unit and blend to meet job mix requirements by adjustments of variable speed feed belts and gates on each bin.
- .4 Meter total flow of aggregate using electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump to ensure proportions of aggregate and asphalt entering mixer remain constant.
- .5 Allow for easy calibration of weighing systems for aggregates without having material enter mixer.
- .6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
  - .1 Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time.
  - .2 Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.
- .7 Make provision for conveniently sampling full flow of materials from cold feed.
- .8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.
- .9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream.
  - .1 Control heating to prevent fracture of aggregate or excessive oxidation of asphalt.
  - .2 Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator.
  - .3 Submit printed record of mix temperatures at end of each day.
- .11 Ensure mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer is 2 % maximum.

- .3 Temporary storage of hot mix:
  - .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
  - .2 Do not store asphalt mix in storage bins in excess of 3 hours.
- .4 While producing asphalt mix for this Project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.
- .5 Addition of anti-stripping agent:
  - .1 Plant to be equipped with pug mill to thoroughly mix aggregates and lime prior to entering the plant.
  - .2 Plant to be equipped with suitable conveyor systems capable of supplying aggregates and lime at constant rate.
  - .3 Plant and equipment used for addition of lime to be equipped with covers to control loss of lime.
  - .4 Plant to be equipped to control rate of lime incorporation to within 1/4%.
  - .5 Add water to aggregate prior to entering pug mill.
  - .6 Add water to lime sufficiently in advance to permit time to slake prior to entering pug mill.

### **3.3 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Follow the temporary erosion and sedimentation control measures provided by the Department Representative to prevent soil erosion and discharge of soil-bearing water runoff.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Apply tack coat in accordance with Section 32 12 13.16 Asphalt Tack Coats prior to paving.
- .3 Prior to laying mix, clean surfaces of loose and foreign material.

### **3.4 TRANSPORTATION OF MIX**

- .1 Transport mix to job site in vehicles cleaned of foreign material and plants prior to entering Jasper National Park. Refer to Basic Impact Assessment and National BMPs.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required.
  - .1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.



- .3 Schedule delivery of material for placing in daylight, unless Department Representative approves artificial light for night placing.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.
  - .1 Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact.
  - .1 Deliver and place mixes at temperature within range as directed by Department Representative, but not less than 135 degrees C.

### **3.5 PLACING**

- .1 Obtain Department Representative's approval of base prime coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as indicated.
- .3 Placing conditions:
  - .1 Place asphalt mixtures only when air temperature is 5 degrees C minimum.
  - .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
  - .3 Do not place hot mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness as follows:
  - .1 Minimum compacted lift thickness is 50 mm.
  - .2 Maximum compacted lift thickness is 80 mm.
- .5 Where possible do tapering and levelling where required in lower lifts.
- .6 Spread and strike off mixture with self propelled mechanical finisher.
  - .1 Construct longitudinal joints and edges true to line markings.
  - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver.
    - .1 Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
  - .3 Maintain constant head of mix in auger chamber of paver during placing.
  - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
  - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
  - .6 Correct irregularities in surface of pavement course directly behind paver.

- .7 Do not throw surplus material on freshly screeded surfaces.
- .7 When hand spreading is used:
  - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.
    - .1 Use measuring blocks and intermediate strips to aid in obtaining required cross section.
  - .2 Distribute material uniformly without broad casting material.
  - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes.
    - .1 Reject material that has formed into lumps and does not break down readily.
  - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
  - .5 Provide heating equipment to keep hand tools free from asphalt.
    - .1 Control temperature to avoid burning material.
    - .2 Do not use tools at higher temperature than temperature of mix being placed.

### **3.6 COMPACTING**

- .1 Roll asphalt continuously using established rolling pattern for test strip and to density of not less than 97% of maximum density determined for test strip.
- .2 Do not change rolling pattern unless mix changes or lift thickness changes.
- .3 Roll asphalt continuously to density not less than 97% of blow Marshall density to.
- .4 General:
  - .1 Provide at least 2 rollers and as many additional rollers as necessary to achieve specified pavement density. When more than 2 rollers are required, 1 roller must be pneumatic tired type.
  - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
  - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
  - .4 Use static compaction for levelling coarse less than 25 mm thick.
  - .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
  - .6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
  - .7 Keep wheels of roller slightly moistened with water to prevent pick up of material but do not over water.
  - .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

- .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
- .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.
  - .1 Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
- .11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
- .12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re rolling.
- .5 Breakdown rolling:
  - .1 Begin breakdown rolling with vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
  - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
  - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super elevated sections use operation approved by Department Representative.
  - .4 Use only experienced roller operators.
- .6 Intermediate rolling:
  - .1 Use pneumatic rubber tire roller and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
  - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .7 Finish rolling:
  - .1 Accomplish finish rolling with two axle or three axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks.
    - .1 If necessary to obtain desired surface finish, use pneumatic tired rollers as directed by Department Representative.
  - .2 Conduct rolling operations in close sequence.

### **3.7 JOINTS**

- .1 General:
  - .1 Remove surplus material from surface of previously laid strip.
    - .1 Do not deposit on surface of freshly laid strip.
  - .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
  - .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

- .2 Transverse joints:
  - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
  - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
  - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal joints:
  - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
  - .2 Prevent Cold joints. Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
    - .1 If the joint temperature falls behind 105 Degree C, back up and pave the other lane to prevent cold joints.
    - .2 If cold joint cannot be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
  - .3 Overlap previously laid strip with spreader by 50 to 80 mm.
  - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
  - .5 Roll longitudinal joints directly behind paving operation.
  - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.
- .4 Construct butt joints as indicated.

### **3.8 FINISH TOLERANCES**

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm.

### **3.9 THICKNESS TOLERANCE**

- .1 Representative Cores: At the Department Representatives request, the quality assurance laboratory will take one or more sets of cores from asphalt pavement suspected to be deficient in total thickness, each set comprising 3 cores whose average thickness represents not more than 1000 m2 of asphalt pavement.
- .2 The contractor to perform their own coring to ensure the required thickness is met.
- .3 Deficient Thickness: No payment shall be made for areas of pavement found deficient in thickness by 8 mm/50mm design lift thickness or more. Pavement deficient in thickness by 8 mm/50mm design lift thickness or more shall be removed and replaced

### **3.10 DENSITY TOLERANCE**

- .1 Sampling and Testing: The quality assurance laboratory will:
  - .1 Determine the density of laboratory compacted Marshall specimens at a minimum frequency of one Marshall density for every 1000 tonnes of hot-mix, or a day's production, whichever is less.
  - .2 Use of Nuclear Densometer and test for density.
- .2 Contractor to perform their own density testing to ensure that all density requirements are met.
- .3 Basis of Acceptance: Pavement compaction will be accepted on the basis of the ratio in percent of the core density to the density of Marshall specimen. If cores were drilled from mat where no Marshall specimen was taken, acceptance will be based on the ratio of core density to the average density of all Marshall specimens to date.
- .4 Representative Cores: A single core is initially taken representing the quantity of hot-mix in not more than 1000 m<sup>2</sup> of mat, with a minimum of one core taken from a day's production. If the initial core density is below specified, that initial density is discarded, and 3 new cores will be taken from the same area. The average density of the 3 new cores represents that area.
- .5 Deficient Density: No payment shall be made for areas of pavement found not meeting the minimum 97% of the 75-blow Marshall density. Pavement not meeting the minimum density shall be removed and replaced.

### **3.11 DEFECTIVE WORK**

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
  - .1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

### **3.12 CLEANING**

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

**END OF SECTION**

## **1 General**

### **1.1 SECTION INCLUDES**

- .1 Requirements and installation of pavement markings.

## **2 Products**

### **2.1 COLD PLASTIC MARKINGS**

- .1 The material shall be manufactured for application by extrusion onto pavement in liquid form with glass spheres both mixed in and dropped onto the material after application.
- .2 The compound shall not deteriorate by contact with sodium chloride, calcium chloride, or other chemicals used against formation of ice on roadways or streets, or because of oil content of pavement materials or from oil dropping from traffic.
- .3 In the plastic state, the materials shall not give off fumes which are toxic or otherwise injurious to persons or property.
- .4 To insure the best possible adhesion, the compound as specified shall be installed in a liquid state in a temperature range of -10°C to +35°C. The material shall not be subject to discoloration or bond failure due to ultraviolet rays from the sun.
- .5 During the manufacture, reflectorizing glass spheres shall be mixed into the material to the extent of not less than 20% or more than 50% by weight of the material.
- .6 Glass spheres shall also be automatically applied to the surface of the material at a uniform rate of approximately 140 grams per square metre. The glass spheres shall be applied while the plastic is in a liquid state.
- .7 The curing time shall be controllable by the workers. Normal curing time shall be from 10 to 35 minutes. Total, 100% curing should be complete in under one hour.
- .8 Physical Requirements - Pavement Markings:
  - .1 *Colour:* Marking shall be brilliant white or yellow. Brightness is the value obtained with the Gardner Multi-Purpose Reflectometer when measuring 0° to 45° daylight luminous directional reflectance with the green filter shall not be less than 70% for white or 45% for yellow.
  - .2 *Water Absorption:* Materials shall have no more than 0.5% by weight of retained water then tested by ASTM designation D-570, "Water Absorption of Plastics," Procedure (A) (24-hour immersion).

- .3 *Softening Point*: Materials shall not have a softening point.
- .4 *Specific Gravity*: Specific gravity of the plastic compound at 25°C shall be from 1.90 to 2.20.
- .5 *Abrasion Resistance*: Materials shall have a maximum weight loss of 1.0 gram when subjected to 200 revolutions on a Taber Abrader at 25°C using H-22 calibre wheels weighted to 500 grams. The test samples shall be prepared by forming representative lots of materials at a thickness of 3 mm  $\pm$  0.1 mm on a 100 mm square plate. The test surface shall be kept wet during the test.
- .6 *Indentation Resistance*: The reading of the Shore Durometer Type A2, as described in ASTM designation D-1706, after fifteen seconds and using a 0.907 kg weight, shall not be less than the amounts specified below when the material is tested after heating for four hours:

<u>Temperature</u>	<u>Reading</u>
46°C	65 $\pm$ 2
25°C	90 $\pm$ 2

- .7 *Chemical Resistance*: 5 cm x 5 cm test sections should show no signs of degradation after exposure to:
- .9 Other Requirements:
- .1 The material shall be suitable for application in film thickness from 1.0 mm to 7.0 mm. Normal surface applications will be from 1.5 mm to 3.0 mm thick.
- .2 The material when cured shall be flexible when cast into the following film thickness:
- .1 Parking Lot Stalls: 1.0 mm
- .2 Elsewhere: 2.0 mm to 5.0 mm.
- .3 The material shall contain no solvents.
- .4 The material shall be suitable for application on concrete, and on new and old asphalt. Bond strength shall be sufficient for the material to remain in place for a number of years under most normal conditions.
- .10 Approved material: Lafrentz System 400 or approved equal.
- .11 General Requirements - Glass Beads:
- .1 *Imperfections*: The surface of the spheres shall be smooth and free from film, scratches, and pits. At least 80% shall be of true spherical shape and free from milkiness, dark or air inclusions, and other defects.
- .2 *Index of Refraction*: The liquid immersion method at 25°C may be used to determine the refractive index of glass spheres. A refractive index of 1.50 to 1.60 is required.

.3 *Gradation:* The spheres shall meet the gradation requirements when tested in accordance with ASTM designation D-1214.

.4 Spheres included in manufacture and application on liquid material shall meet the following standards:

U.S. Standard Sieve	% Passing
Passing #900 µm	90 - 100
Passing #300 µm	20 - 50
Passing #200 µm	0 - 10

## 2.2 TRAFFIC PAINT

### .1 Materials

#### .1 Paint:

.1 To CGSB 1-GP-74M, alkyd traffic paint.

.2 Colour: to CGSB 1-GP-12C, yellow 505-308 white 513-301.

.2 Thinner: to CGSB 1-GP-5M.

.3 Glass beads: Overlay type: to CGSB 1-GP-74M.

## 3 Execution

### 3.1 EXISTING PAVEMENT MARKINGS

- .1 Where the location of the new markings conflict with existing pavement markings, the new marking shall be installed in the same line as the existing marking, ensuring that the new marking completely covers the previous marking material.

### 3.2 COLD PLASTIC APPLICATION

- .1 Mix components and apply cold plastic marking according to manufacturer's surface application procedure, to a thickness of 1.0 mm minimum and 3.0 mm maximum.
- .2 Apply plastic markings in accordance with manufacturer's instructions and procedures.
- .3 Apply glass beads to surface of extruded material before it has set, at a rate of 140 g/m<sup>2</sup>.
- .4 Do not permit traffic over applied markings until they have adequately hardened.



### **3.3 PAINT APPLICATION**

#### **.1 Equipment Requirements:**

.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

.2 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.

#### **.2 Conditions of Surfaces:**

.1 Pavement surface to be free from surface water, frost, ice, dust, oil, grease and other foreign materials.

#### **.3 Application:**

.1 Lay out pavement markings and have approved by Department Representative prior to application.

.2 Unless otherwise approved by Department Representative, apply paint only when air temperature is above 10°C and no rain is forecast.

.3 Apply traffic paint evenly at rate of 3 m<sup>2</sup>/L.

.4 Do not thin paint unless approved by Department Representative.

.5 Symbols and letters to conform to dimensions indicated.

.6 Paint lines to be of uniform colour and density with sharp edges.

.7 Thoroughly clean distributor tank before refilling with paint of different colour.

.8 Apply glass beads at rate of g/m<sup>2</sup> of painted area.

#### **.4 Tolerance:**

.1 Paint markings to be within plus or minus 12 mm of dimensions as indicated.

#### **.5 Protection of completed work:**

.1 Protect pavement markings until dry.

### **3.4 TRAFFIC CONTROL AND WORK AREA**

- .1 The Contractor shall at all times keep traffic congestion to a minimum. The work shall be undertaken from one lane and all men, materials and equipment shall be contained as much as possible in that lane. The work shall be carried out as quickly as possible to prevent excessive delay and inconvenience to traffic.

- .2 All equipment or combination of equipment used in application, including the grinder, vacuum machine or sweeper, material applicator and cone truck shall operate within 100 metres at one time.

### **3.5 PREMARKINGS**

- .1 The Contractor is responsible for premarking all work. Premarking must be done on a clean dry road surface. All premarking is to be done with premarking paint approved by the Department Representative.
- .2 All premarking shall be approved by the Department Representative prior to the installation of the pavement markings. Changes in the alignment of markings that do not correspond to the plans may be made in the field by the Department Representative. Any changes made in the field must be recorded by the Contractor on plans issued by the owner and returned to the owner within seven (7) working days after completion of the job.
- .3 Any premarking lines remaining after a period of six (6) weeks must be removed or blacked out by the Contractor at his expense.
- .4 Final markings should be installed as soon as possible but no later than seven (7) calendar days after premarking.

### **3.6 ADHESION TO PAVEMENT**

- .1 The Contractor shall make all tests and take all samples necessary to assure adequate adhesion between the thermoplastic material and the pavement. Acceptance of this Contract shall be evidence that the Contractor is satisfied that no adhesion problems will be encountered.

### **3.7 WORKMANSHIP**

- .1 Faulty markings such as non-straight lines, too much overflow or non-uniform lengths must be re-done within five (5) working days.
- .2 The Contractor shall remedy all defects in the work due to faulty material of workmanship or failure of the work itself for a period of two (1) years from the date of the Completion Certificate.
- .3 The Department Representative shall give the Contractor written notice of all defects observed within the maintenance period. The maintenance shall be a continuous operation and shall be carried on until expiration of the maintenance period, unless there is an outstanding order from the Department Representative requiring the Contractor to correct some of the maintenance that has not been completed. The maintenance period shall be in effect until such time as the Department Representative issues a Final Completion Certificate.

**END OF SECTION**

## **1 General**

### **1.1 RELATED SECTIONS**

- .1 Section 01 35 43 - Environmental Procedures.

### **1.2 REFERENCES**

- .1 Edith Cavell Rehabilitation Restoration Plan

## **2 Products**

### **2.1 NOT USED**

- .1 Topsoil stockpile used for restauration is located at the laydown yard.

## **3 Execution**

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

- .1 Department Representative has provided a site specific erosion and sediment control plan in Appendix B.
- .2 Follow the erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 PREPARATION OF EXISTING GRADE**

- .1 Verify that grades are correct.
  - .1 If discrepancies occur, notify Department Representative and do not commence work until instructed by Department Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
  - .1 Remove debris which protrudes more than 75 mm above surface.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

### **3.3 PLACING AND SPREADING OF TOPSOIL IN DITCHES**

- .1 Place topsoil after Department Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 100 mm.

- .3 Manually spread topsoil/planting soil around trees, shrubs, live stakes and obstacles.

### **3.4 PLACING AND SPREADING OF TOPSOIL IN RESTORATION ZONES**

- .1 Place topsoil after Department Representative has accepted subgrade.
- .2 Spread topsoil in rough and loose mounds of 100mm – 400mm depths. Refer to the Edith Cavell Rehabilitation Restoration Plan Appendix D.
- .3 Manually spread topsoil around trees, shrubs and obstacles.

### **3.5 FINISH GRADING**

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Restore and finish entire area disturbed by construction.

### **3.6 ACCEPTANCE**

- .1 Department Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

### **3.7 SURPLUS MATERIAL**

- .1 Dispose of materials except topsoil not required where directed by Department Representative.

### **3.8 CLEANING**

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

**END OF SECTION**

## **1 General**

### **1.1 RELATED SECTIONS**

- .1 Section 32 91 19 Topsoil Placement and Grading

### **1.2 REFERENCES**

- .1 Definitions:
  - .1 Mycorrhiza: association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.
- .2 References:
  - .1 Edith Cavell Rehabilitation Restoration Plan
  - .2 Agriculture and Agri Food Canada (AAFC).
    - .1 Plant Hardiness Zones in Canada, 2000.
  - .3 Canadian Nursery Landscape Association (CNLA)
    - .1 Canadian Standards for Nursery Stock, 2006.
  - .4 Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .5 Weed Control Act – Province of Alberta

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Scheduling: obtain approval from Department Representative of schedule 7 days in advance of shipment of plant material. Schedule to include:
  - .1 Quantity and type of plant material.
  - .2 Shipping dates.
  - .3 Arrival dates on site.
  - .4 Planting Dates.

### **1.4 ACTION AND INFORMATION SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittals
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for trees, shrubs, ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and include product characteristics, performance criteria, physical size, finish and limitations.

- .2 Submit 2 copies of WHMIS MSDS.
- .3 Samples:
  - .1 Submit samples of mycorrhiza.

## **1.5 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Landscape Contractor: to be a Member in Good Standing of Landscape Alberta Nursery Trades Association (LANTA).
  - .2 Landscape Planting Supervisors: "Landscape Industry Certified" Technician with Softscape Installation Specialization as regulated by Canadian Nursery Landscape Association (CNLA).

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

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .1 Protect plant material from frost, excessive heat, wind and sun during delivery.
  - .2 Protect plant material from damage during transportation:
    - .1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
    - .2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
    - .3 Protect foliage and root balls using anti desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.
    - .4 Pad all points of contact between plant material and equipment.
- .3 Unload and inspect all plants immediately upon arrival to site and water as required. Trees with cracked or broken root balls will not be accepted.
- .3 Storage and Handling Requirements:
  - .1 Immediately store and protect plant material which will not be installed within 24 hours in accordance with supplier's written recommendations and after arrival at site in storage location approved by Department Representative.
  - .2 Protect stored plant material from frost, wind and sun and as follows:
    - .1 For bare root plant material, preserve moisture around roots by heeling in burying roots in topsoil and watering to full depth of root zone.
    - .2 For pots and containers, maintain moisture level in containers.

- .3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.
- .4 For live cuttings, obtain necessary permit from Parks Canada prior to harvest, collect in dormant season only, soak and install immediately after harvest; ensure cuttings are not left in direct sun between soaking and installation. If immediate installation is not possible, cuttings shall be sent to nursery to be rooted.
- .3 Store and manage manufactured materials in a weatherproof location in accordance with manufacturer's written instructions.
- .4 Packaging Waste Management:
  - .1 Collect and separate for disposal and recycling palettes, crates, padding and packaging materials.
  - .2 Dispose / recycle materials at appropriate facilities.

## **1.7 SUBSTITUTION**

- .1 All substitutions shall be made through a change order to the Contract.

## **1.8 WARRANTY**

- .1 Contractor hereby warrants that plant materials as itemized on the plant list will remain free of defects, but for two (2) years following the year of installation, providing adequate maintenance has been provided.
- .2 End of warranty inspection will be conducted by Department Representative.
- .3 Department Representative reserves the right to extend the Contractor's warranty responsibilities for an additional one year if, at the end of the initial warranty period, leaf development and growth is not sufficient to ensure future survival.

## **2 Products**

### **2.1 PLANT MATERIAL**

- .1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.
  - .1 Only native species of wild provenance will be installed. Plant material will be sourced from seed zones Subalpine 1.1 or 2.2 unless otherwise approved the Client.
  - .2 Plant material must be planted in zone specified as appropriate for its species.
  - .3 Plant material in location appropriate for its species.
- .2 Plant material: plants shall be generally true to type and structurally sound, well branched, healthy and vigorous and free of disease, insect infestations, insect eggs,



rodent damage, sunscald, frost cracks and mechanical wounds. They shall be densely foliated when in leaf and have a healthy, well-developed root system. Pruning cuts shall show vigorous bark on all edges and all parts shall be moist and show live, green cambium tissue when cut.

.3 Root balls:

- .1 Shall be of a diameter as specified in the CNLA Canadian Standards for Nursery Stock. Root ball sizes are a minimum and shall be adjusted according to the growth habit of plants.
- .2 Root ball sizes shall be sufficiently large to contain at least 75% of the fibrous root depth.
- .3 The root ball shall contain all the original soil in which the tree has grown and shall be free of all weeds and vegetation. It shall be firmly wrapped in burlap and secured to prevent any soil from spilling or drying out.
- .4 Any increase or decrease in tree size shall require a corresponding adjustment to the root ball size to conform to CNLA Canadian Standards for Nursery Stock.

.4 Coniferous trees:

- .1 Coniferous trees shall be of normal shape and quality for the species. Trees with broken or missing leaders will not be accepted.
- .2 Where 1-or-2-year seedlings are not used, spruce varieties shall have uniform branching which starts no higher than 300mm from the root collar. Pine varieties shall have uniform branching which starts no higher than 600mm from the root collar.
- .3 Where 1- or 2-year seedlings are not used, root balls for coniferous trees to be:

<u>Tree Height Range</u>	<u>Ball Diameter</u>
1.8 – 2.4m	86 cm
2.5 – 3.0m	100 cm
3.1 – 3.5m	122 cm

- .4 Where 1- or 2-year seedlings are not used, pines to have oversized minimum root ball diameter (for trees 2.5m height) of 1150mm.
- .5 Collected stock: Any plants dug from native stands, woodlots, orchards or neglected nurseries and have not received proper cultural maintenance as advocated by the Canadian Nursery Landscape Association.
  - .1 The use of collected stock will not be permitted unless previously inspected and approved in writing by Department Representative.
  - .2 Trees collected from native stands or established plantings must be so designated and approved by the Client prior to planting. Root balls shall be at least ten percent larger in diameter than nursery grown stock.

- .6 Collected cuttings: Any live cuttings (i.e. willow stakes) collected from native stands.
  - .1 Location of cuttings require approval by the client prior to collection.
  - .2 Care of cuttings to follow requirement of 1.6.3 of this specification.
  - .3 Willow collection for live staking will occur under supervision of personnel with training and experience in live staking.
- .7 Shrubs shall have natural form typical of the species with a minimum of four canes.
- .8 Vines shall have at least four runners, each of a minimum length of 300mm.
- .9 Ground covers shall have well developed tops, size proportionate to the developed roots typical of the species.
- .10 Plants that have been top-worked, sheared or colour treated are not acceptable.

## **2.2 TOPSOIL**

- .1 As specified in Section 32 91 19- Topsoil Placement and Grading.

## **2.3 WATER**

- .1 Free of impurities that would inhibit germination and growth.
- .2 Contractor responsible for hauling water to site. Water is available free of charge from 1 Compound Road in Jasper.

## **2.4 STAKES**

- .1 T bar, steel, 40 x 40 x 5mm thick, 2100mm in length (not including 1-year or 2-year old seedlings).

## **2.5 WIRE TIGHTENER**

- .1 Type 1: galvanized steel, stamped plate type rod, triangular shape (not including 1- or 2-year old seedlings).

## **2.6 GUYING WIRE**

- .1 Galvanized #12 guy wire or approved equal (not including 1-year or 2-year old seedlings).

## **2.7 GUYING COLLAR**

- .1 2 ply, reinforced, 12mm black rubber hose, or approved equal (not including 1-year or 2-year old seedlings).

## **2.8 FERTILIZER**

- .1 Fertilizer is not recommended for the native plantings. If used, a maximum of 1 initial fertilization is permitted.

## **2.9 ANTI DESSICANT**

- .1 Wax like emulsion

## **2.10 FLAGGING TAPE**

- .1 Fluorescent orange colour

## **2.11 SOURCE QUALITY CONTROL**

- .1 Obtain approval from Department Representative of plant material prior to planting. Previous approval of plant material shall not impair the right of Department Representative during construction to reject plants which have been damaged or which, in any way, do not conform to the Specifications.
- .2 Imported plant material must be accompanied with necessary permits and import licences. Conform to Federal, Provincial or Territorial regulations.

## **3 Execution**

### **3.1 PLANTING SEASON**

- .1 Plant trees, shrubs and ground covers only during periods that is normal for such work. It is recommended that all coniferous material should be planted in spring or early summer only.

### **3.2 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections are acceptable for planting installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Department Representative.
  - .2 Inform Department Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.
  - .4 Commencement of planting operations implies acceptance of subgrade.

### **3.3 PRE-PLANTING PREPARATION**

- .1 Proceed only after receipt of written acceptability of plant material from Department Representative.

- .2 Remove damaged roots and branches from plant material.
- .3 Apply anti desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.
- .4 Notify and acquire written acknowledgment from utility authorities before beginning excavation of planting pits for trees and shrubs.

### **3.4 EXCAVATION AND PREPARATION OF PLANTING BEDS AND PITS**

- .1 Preparation of planting beds in accordance with Section 32 91 19 Topsoil Placement and Grading.
  - .1 All topsoil used to be salvaged from site.
  - .2 In planting areas topsoil to be placed in 100-400mm depth rough and loose mounds as per the Edith Cavell Rehabilitation Restoration plan.
- .2 Stake out location and obtain approval from Department Representative prior to excavating.
- .3 Planting beds:
  - .1 Excavate to depths as shown on the Drawings.
- .4 Tree pits:
  - .1 Excavate to depth and width as indicated on the Drawings.
    - .1 Depth of planting hole to be 40mm less than height of the root ball, such that following planting, the top of the rootball is 40mm above grade.
  - .2 Remove rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material off site as directed by Department Representative.
  - .3 Scarify sides of planting hole.
  - .4 Remove water which enters excavations prior to planting. Notify Department Representative if water source is ground water.

### **3.5 PLANTING**

- .1 For bare root stock, place 50mm backfill soil in bottom of hole.
  - .1 Plant trees and shrubs with roots placed straight out in hole.
- .2 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.
  - .1 Do not pull burlap or rope from under root ball.

- .2 If circling roots are found in the root ball, cut the root at the beginning of the circling.
- .3 For container stock or root balls in non degradable wrapping, remove entire container or wrapping without damaging root ball.
- .1 If circling roots are found in the root ball, gently loosen roots and cut container vertically with a sharp knife to allow root ball to become free.
- .4 Plant vertically in locations as indicated.
- .5 Orient plant material to give best appearance in relation to structure, roads and walks.
- .6 For trees:
  - .1 Backfill soil in 150 mm lifts.
    - .1 Do not place soil while frozen or muddy.
    - .2 Tamp each lift to eliminate air pockets.
    - .3 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.
    - .4 After water has penetrated into soil, backfill to finish grade.
- .7 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.
- .8 Water plant material thoroughly.
- .9 After soil settlement has occurred, fill with soil to finish grade.

### **3.6 TREE SUPPORTS**

- .1 Install tree supports for large trees, not including 1-year or 2-year old seedlings.
- .2 Support plants with stakes and guy wires immediately after installation.
- .3 Install tree stakes as indicated.
- .4 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed 2.5 m above grade.
  - .1 Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance.
- .5 Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk.

- .6 Attach guy wire to stakes. Tension wire and secure by installing clamps.
- .7 Install wire tightener ensuring that guys are secure and leave room for slight movement of tree. All guy wires to be folded or bent in such a fashion so as to not be exposed outwardly.
- .8 Install flagging tape to guys as indicated.
- .9 After tree supports have been installed, remove broken branches with clean, sharp tools.

### **3.7 MAINTENANCE**

- .1 Watering:
  - .1 Installed plant materials shall be monitored and watered by the contractor as necessary to reflect traditional site conditions. Willow cuttings associated with log pond sediment control structures may require watering on a weekly basis during the first growing season to ensure successful establishment.
- .2 Contractor will inspect installed plant material several times during the two (2) growing seasons to ensure adequate moisture is available to establish plant materials.  
Weed (Invasive Species) Control:
  - .1 Contractor will be responsible for hand pulling weeds (invasive species) twice in July and twice in August of the two (2) years following plant installation. Weeds shall include any species listed as exotic on the Alberta Conservation Information Management System (ACIMS).
  - .2 When removing weeds ensure all parts of the plant are removed.
  - .3 Weeds maintenance shall include all areas of the site effected by construction (including trails, parking lots, and laydown area)

### **3.8 REPLACEMENTS**

- .1 All required replacements shall be of plants of the same size and species as specified on the Drawings and shall be supplied and planted in accordance with the Drawings and Specifications.

### **3.9 ACCEPTANCE**

- .1 Trees and groundcovers will be accepted by Department Representative provided plant materials are in a vigorous, healthy condition, meet or exceed the sizes indicated on the Drawings, are structurally sound and of a shape and form typical of the species.

**END OF SECTION**

## **1 General**

### **1.1 SCOPE**

- .1 Design, supply, transport to site, off load, store, install, test, start-up and commission one (1) sewage storage tank.

### **1.2 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittals.
- .2 Submit drawings stamped and signed by a Professional Engineer in the Province of Alberta.
- .3 Include:
  - .1 Outline and arrangement drawings (dimensioned) including foundation support requirements, and pipe connection details.
  - .2 Locations of all fittings, accessories, hold down points, and critical dimensions.
  - .3 Cross-sectional drawings and parts list.
  - .4 Materials of construction.
  - .5 Anchor bolt design.
  - .6 Deadman anchor design.
  - .7 Equipment weights.
  - .8 Gauge Chart for each tank indicating contained volume (in litres) of each tank for each centimeter of depth of contained liquid. Gauge Charts shall be based on actual tank capacity and shall be accurate within 0.1% of tank volume.

### **1.3 MAINTENANCE DATA**

- .1 Provide maintenance data for incorporation into manual specified in Section 01 33 00 - Submittals.
- .2 Data to include:
  - .1 Manufacturers name, type, model year, capacity and serial number.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list with names and addresses.



## **2 Products**

### **2.1 SEWAGE STORAGE TANKS**

#### **.1 General**

##### **.1 Description**

- .1 Fibreglass reinforced plastic (FRP) underground storage tanks of single wall construction for sewage storage.

#### **.2 Tank Design**

- .1 Tank shall be Single Wall Construction.
- .2 Tank capacity shall be 4.55 m<sup>3</sup>.
- .3 Tank shall be capable of burial up to 1.0 metres to top of tank.
- .4 Tank shall have integrally moulded ribs for reinforcement of tank walls against pressures due to soil and high water table.
- .5 Tank may be of multiple compartment design. Internal bulkheads shall be hemispherical or ellipsoidal shaped to resist deflection and breakage due to internal liquid levels.
- .6 Tank shall be constructed of such materials, and by such process, that they shall not break, collapse or corrode due to the exposure to ambient soil or water or internal content.

#### **.3 Loading Conditions**

- .1 When installed according to the manufacturer's instructions, the Tank shall meet the following design conditions:
- .2 The tank will withstand external loads due to soil and water table with a 3:1 safety Factor against failure and without deflection beyond manufacturer's recommended limits. Such loading shall be considered with tank empty of all liquid and external water levels at surface of backfill.
- .3 Tank shall withstand surface H-20 axle loading of any position over the tank without failure or deflection beyond manufacturer's recommended limits.
- .4 Tank shall resist continuous uplifting forces due to ground water pressure without rising or deflection beyond manufacturer's recommended limits. Such loading shall be considered with tank empty of all liquid and external water levels at surface of backfill.

.4 Testing

- .1 Each tank, tank compartment, and interstice shall be tested by manufacturer with 35 kPa (5 psi) internal pressure. During pressure test, the exterior of the tank shall be tested to be free of leaks with soapy water solution.
- .2 Each tank shall be designed such that it is capable of being subjected to a Leak Test after installation.

.5 Pressure Rating

- .1 Except while being tested in accordance to the manufacturer's Installation Instructions, or other methods approved by the manufacturer, the tank shall not be subjected to any pressure or vacuum.
- .2 Tank shall be vented at all times.

.6 The tank shall be furnished with the following accessories

- .1 One 200 mm diameter PVC vent tube.
- .2 One 200 mm diameter drop tube.
- .3 Calibrated Dip Stick at 1 cm intervals.
- .4 Installation Instructions for all above components, including instructions for wet and dry hole installation, and procedures for installation of Anchor Systems.
- .5 Where indicated on the drawings, the tank(s) shall be supplied with the following accessories:

.7 Product Storage

- .1 Tank shall be capable of storing liquids with specific gravity up to 1.1.

.8 Anchoring System

- .1 Anchoring System consisting of pre-cast reinforced concrete "deadman" components, complete with an appropriate number of straps and turnbuckles.
- .2 Anchors shall be designed with attachment points corresponding to designated anchorage positions of tank(s).
- .3 Anchors shall have a total overall length equal to the tanks to which they are attached.
- .4 Tank shall be attached to anchors by means of non-corroding straps which extend between anchors and over the tanks at designated positions. Straps shall attach to anchors by means of hooks. Each strap shall be capable of being adjusted for snug fit by means of a turnbuckle.
- .5 Anchors shall be "inverted T" cross sectional profile for maximum load carrying capability.

- .6 Anchor System shall be designed to distribute loading equally between designated anchoring points on tank.
- .7 Anchoring system shall not interfere with the backfill beneath tanks.
- .8 Loading Conditions
  - .1 When installed according to manufacturer's instructions, Anchoring System shall be capable to withstanding continuously the uplift forces caused by ground water pressure. Such loading shall be considered with the tank empty of all liquid and external water levels at surface of backfill.
  - .2 Each component of the Anchoring System shall have a minimum factor of safety of 1.2:1 against failure under the most severe loading condition. Such loading shall be considered with tank empty of all liquid and external water levels at surface of backfill.
- .9 Materials
  - .1 Anchors shall be constructed from 25 MPa minimum strength, sulfate resistant concrete, reinforced internally with steel reinforcing bar. All internal reinforcement shall be cross-tied to prevent pullout of hold down points. All exposed reinforcing steel to be corrosion protected with bonded epoxy coating.
  - .2 Straps to be fabricated from unidirectional fiberglass material and epoxy by process of pultrusion. Strap shall have a minimum of 75% by weight glass content, be uniform in glass distribution and in cross section. Metallic components shall be cast nodular iron with galvanized coating. Bonding of metallic components to strap shall be by epoxy system. Straps shall be provided with alignment clips to hold strap in designated location on tanks.
  - .3 Turnbuckles shall be of steel construction with galvanized coating. Turnbuckle shall bear manufacturer's making symbol for component traceability.
- .10 Testing and Certification
  - .1 Each strap assembly shall be proof tested by manufacturer to minimum 150% of design load. Manufacturer shall supply Department Representative ed design calculations demonstrating that the anchoring system shall provide the necessary hold-down force for the design.

### **3 Execution**

#### **3.1 GENERAL**

- .1 Store equipment and components to prevent damage and loss.

#### **3.2 SHIPPING AND STORAGE OF EQUIPMENT**

- .1 Enclose the mating pieces of the equipment in suitable heavy duty wrapping, tied to the equipment.

- .2 Flanged connections shall be blanked with bolted wood or metal covers no smaller than the flange outside diameter. Fit threaded connections with pipe plugs. Enclose all exterior bearing housing in polyethylene wrapping to positively excluded moisture, dust or dirt. Protect electric motor so as to prevent deterioration or damage due to entry of moisture, dust or dirt into the windings or bearings during shipment.
- .3 Equipment shall be shipped in manageable sections ready for assembly in place. The equipment may be stored before installation and shall be prepared for storage before the shipment. The Supplier shall provide explicit instruction on the storage of the equipment to prevent deterioration.
- .4 Coordinate scheduling of equipment shipment, delivery, off-loading and storage.
- .5 Protect equipment from damage, construction activities, dust, damp, adverse weather and temperatures.

### **3.3 INSTALLATION**

- .1 Make equipment installation and connections by skilled tradesmen to the best standard.
  - .1 Carry out work to produce a neat, accurate, secure, functional installation.
  - .2 Repair at own expense, any damage done to the installation of materials while carrying out the work.
- .2 Install foundation bedding in advance of equipment installation in accordance with manufacturer's instructions.

### **3.4 EQUIPMENT TESTING PROCEDURE**

- .1 Submit a thorough description of the procedures to be employed in testing this equipment. The procedure will be reviewed by the Department Representative for suitability and should be submitted three (3) weeks prior to any testing.
- .2 Include:
  - .1 Safety precautions to be employed.
  - .2 Previous testing experience of Contractor's personnel or subtrades.

### **3.5 FIELD TESTING**

- .1 When equipment installation has been completed to the standards indicated by these specifications, arrange for the services of the equipment manufacturer's technical representative.
- .2 The equipment manufacturer's technical representative shall inspect the installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, correct the deficiencies indicated by the

technical representative. Start, run and adjust equipment at this time. The technical representative shall then advise the Department Representative in writing that the installation has been checked, has been installed correctly and is in working order.

- .3 Bear all the costs of the equipment manufacturer's technical representative.

### **3.6 EQUIPMENT MANUFACTURER'S REPRESENTATIVE**

- .1 The equipment manufacturer's technical representative shall be familiar with the equipment supplied and shall come prepared with both knowledge and equipment to perform and interpret the test, inspections and procedures recommended by the manufacturer for the starting of equipment that has not previously been run.
- .2 The equipment manufacturer's technical representative shall, immediately after completion of the inspection, convey to the Department Representative in writing, confirmation of the tests and inspections carried out and the result of this examination of the work.
- .3 If the inspection reveals defects in the work, correct as soon as possible and repeat the entire inspection procedure. Repeat until the work passes the inspection.
  - .1 That the test procedure is thorough.
  - .2 That the results of the inspection are well documented by the equipment manufacturer's representative.
  - .3 That the installation meets all manufacturers' requirements for durable and trouble-free operation.

### **3.7 FINAL INSPECTION**

- .1 Final inspection will be made by the Department Representative only after the equipment manufacturer's technical representative has advised that equipment installation is in order and the Contractor has advised in writing that the system can be operated.
- .2 The Department Representative will request that the equipment be operated to demonstrate that it will perform as specified. The Department Representative will note deficiencies, and if possible, the deficiency will be corrected immediately by the Contractor. All deficiencies that cannot be corrected at the time of inspection will be noted by the Department Representative who will advise the Contractor of these deficiencies in writing. Correct the deficiencies as soon as possible and advise the Department Representative of their correction. Should the deficiencies be of a sufficiently serious nature to require the work to be re-inspected, the cost of the inspection shall be borne by the Contractor.

**END OF SECTION**

## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 31 23 33.01 Excavating, Trenching and Backfilling.
- .2 Section 31 05 16 - Aggregate Materials.

### **1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM C136 , Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .2 ASTM D698 , Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft lbf/ft; (600 kN m/m;)).
  - .3 ASTM F667 , Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.
- .2 CSA International
  - .1 CAN/CSA G401 , Corrugated Steel Pipe Products.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

## **2 Products**

### **2.1 CORRUGATED STEEL PIPE**

- .1 Corrugated steel pipe: to CAN/CSA-G401.
- .2 Coating: Standard Galvanized Steel (610g/m<sup>2</sup>).
- .3 Corrugated profile: 68 mm x 13 mm, thickness: 2.0 mm, rivets: 8 mm.
- .4 Coupler Type: Soil-tight Coupler
- .5 End section: Step Beveled End.

### **2.2 GRANULAR BEDDING AND BACKFILL**

- .1 Granular bedding and backfill material to Section 31 05 16 - Aggregate Materials

### **3 Execution**

#### **3.1 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Department Representative has provides a site specific erosion and sediement control plan in Appendix B.
  - .2 Follow the erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways
  - .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### **3.2 TRENCHING**

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

#### **3.3 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 D698.
- .3 Place bedding in unfrozen condition.

#### **3.4 LAYING CORRUGATED STEEL PIPE CULVERTS**

- .1 Begin pipe placing at downstream end.
- .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
- .3 Lay pipe with outside circumferential laps facing upstream .
- .4 Lay paved invert or partially lined pipe with longitudinal centre line of paved segment coinciding with flow line.
- .5 Do not allow water to flow through pipes during construction except as permitted by DepartmentRepresentative.

#### **3.5 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.

.2 Structural plate:

- .1 Erect by connecting plates with bolts at longitudinal and circumferential seams.
- .2 Drift pins may be used to facilitate matching of holes.
- .3 Place plates in sequence recommended by manufacturer with joints staggered .
- .4 Draw bolts up tight, without overstress, before beginning backfill.
- .5 Repair spots where damage has occurred to spelter coating by applying two coats of zinc rich paint approved by Department Representative.

### **3.6 BACKFILLING**

- .1 Backfill around and over culverts as indicated or as directed by Department 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 95% maximum density to ASTM D698 taking special care to obtain required density under haunches.
- .4 Protect installed culvert with minimum 600 mm cover of compacted fill before heavy equipment is permitted to cross.
  - .1 During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.
- .5 Place backfill in unfrozen condition.

### **3.7 CLEANING**

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

**END OF SECTION**



## **1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 31 23 33.01 - Excavation, Trenching and Backfilling.
- .2 Section 31 32 19.01 - Geotextile.
- .3 Section 31 05 16 - Aggregate Materials.

### **1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .2 ASTM D698, 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>)).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 8.1, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB 8.2, Sieves, Testing, Woven Wire, Metric.
- .3 CSA International
  - .1 CAN/CSA-B1800, Thermoplastic Non pressure Pipe Compendium.

### **1.3 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.

## **2 Products**

### **2.1 MATERIALS**

- .1 Perforated Sewer Pipe Poly Vinyl Chloride (PVC):
  - .1 Type: DR 35
  - .2 Diameter: 150 mm.
  - .3 Minimum wall thickness: 4.55 mm.
  - .4 Perforation Configuration Type: B
  - .5 Minimum Stiffness: 320 kpa

- .6 Configuration Type: B
- .7 Primary Hole Size: 16 mm
- .8 Angle: 120 Degree
- .9 Pipe Cover: Textile Sock
- .10 Standards: ASTM D3040 or ASTM F1760 and CSAB182.2 or CSA B182.7
- .2 Solid Wall Pipe Poly Vinyl Chloride (PVC):
  - .1 Type: DR 35
  - .2 Diameter: 150 mm.
  - .3 Minimum wall thickness: 4.55 mm.
  - .4 Perforation Configuration Type: B
  - .5 Minimum Stiffness: 320 kpa
  - .6 Standards: ASTM D3040 or ASTM F1760 and CSAB182.2 or CSA B182.7
- .3 Geotextile in accordance to Section 31 32 19.01 - Geotextile.
- .4 Bedding in accordance to Section 31 05 16 - Aggregate Materials.

### **3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sub-drainage piping installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Department Representative.
  - .2 Inform Department 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 Department Representative.

#### **3.2 TRENCHING**

- .1 Do excavating trenching and backfilling in accordance with Section 31 23 33.01 Excavating, Trenching and Backfilling.
- .2 Place bedding material after approval of excavation by Department Representative.

#### **3.3 BEDDING**

- .1 Place 150 mm layer of bedding material as indicated and compact to minimum 95% of maximum density to ASTM D698.

#### **3.4 INSTALLATION OF PIPE SUB DRAINS**

- .1 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points.
  - .1 Ensure barrel of each pipe is in contact with bed throughout full length.

- .2 Begin laying at outlet and proceed in upstream direction.
- .3 Lay perforated pipes with perforations at 4 o'clock and 8 o'clock positions.
- .4 Lay bell and spigot pipe with bell ends facing upstream.
- .5 Make joints tight in accordance with manufacturer's instructions.
- .6 Plug open upstream ends of pipes with pvc approved fittings.
- .7 Surround pipe with bedding gravel and compact as indicated.
- .8 Surround and cover drain with filter material in uniform 150 mm layers as indicated and compact to at least 95% maximum density to ASTM D698.
- .9 Wrap or sleeve perforated pipe with geotextile filter as indicated.
- .10 Backfill remainder of trench to Section 31 23 33.01- Excavating, Trenching and Backfilling and as indicated.
- .11 Do not place bedding surround and backfill materials in frozen condition.
- .12 Protect sub drains against flotation during installation.

### **3.5 CLEANING**

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

**END OF SECTION**