PARKS CANADA AGENCY

BANFF NATIONAL PARK
PEYTO LAKE DAY USE AREA REHABILITATION
PROJECT NO. FII 1494
UPPER PARKING LOT & TRAILS

ISSUED FOR TENDER DOCUMENTS

JUNE 2020

Parks Canada Parcs Canada

wood.

END OF SECTION

Part 1 General

1.1 PROJECT LOCATION

The project is located at the Peyto Lake Day Use Area in Banff National Park, approximately 40 km north of the Lake Louise Town Site. The limit of work includes the upper parking lots and the trails leading from both parking lots to the viewpoint structure.

1.2 SCOPE OF WORK

.1 The work covered by this Contract shall include mobilization and demobilization, the furnishing of all materials, labour, equipment, tools, supplies, temporary lighting and heating, transportation, quality control, Division 1 requirements, labour and superintendence necessary for the construction of the work as herein specified and shown on the Drawings.

.2 Work under this Contract includes supply and installation of materials and construction of the following:

.1 Upper Parking Lot

.1 The major items in this phase include grading, earthwork, granular base, paving, installation of new washroom building, signage, pavement marking, fencing, and landscaping work.

.2 Trails

.1 The major items in this phase include construction of new trail alignments, paving, rehabilitation of existing trail from upper parking lot to viewpoint to natural conditions, signage and landscaping work.

Contractor shall acknowledge that they have examined the proposed work and the surrounding areas and that they are completely familiar with the detail of the scope and all conditions and/or restrictions which could affect or limit their operations due to such things as environmental constraints, public traffic, and site access.

1.3 CONTRACT METHOD

.1 Construct Work under combined price contract.

.2 Claims for additional costs will not be entertained with respect to the conditions that could have been reasonably ascertained by inspection of the site prior to the Tender closing date.

1.4 WORK BY OTHERS

.1 An existing contractor is currently working (Lower Parking Lot and Viewpoint). The Prime contractor for the overlapping work area (boundary and access) will be existing contractor.

.2 Coordinate and schedule work with that of other Contractors; as to avoid any delays in project schedule and quality of Work, in accordance with the contract.

1.5 WORK SEQUENCE

.1 Construct Work in the stages defined below to accommodate premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

.3 Required stages:

.1 Refer to section 01 14 00 – Work Restrictions.

.4 Maintain fire access/control throughout the duration of the Work.

1.6 LIQUIDATED DAMAGES

.1 Refer to GC 5.10 Assessments and Damages for Late completion.

1.7 CONTRACTOR USE OF PREMISES

.1 Coordinate use of premises with direction of the Departmental Representative.

.2 The Contractor shall obtain a business license from Parks Canada Agency for Work in the National Park area.

.3 The Contractor shall obtain a vehicle work pass from Parks Canada Agency for all business and private vehicles it intends to use on site. All contractor vehicles on site should display the work pass.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.6 At completion of operations, existing condition to be equal to or better than that which existed prior to construction, to the satisfaction of the Departmental Representative.

1.8 OWNER FURNISHED ITEMS

.1 Owner Responsibilities:

.1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
.2 Deliver supplier's bill of materials to Contractor.
.3 Arrange and pay for delivery to site in accordance with Progress Schedule.
.4 Inspect deliveries jointly with Contractor.
.5 Submit claims for transportation damage.
.6 Arrange for replacement of damaged, defective or missing items.
.7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.
.2 Review shop drawings, product data, samples, and other submittals.

.3 Submit to Consultant notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
.4 Receive and unload products at site.
.5 Inspect deliveries jointly with Department Representative; record shortages, and damaged or defective items.
.6 Handle products at site, including uncrating and storage.
.7 Protect products from damage, and from exposure to elements.
.8 Assemble, install, connect, adjust, and finish products.
.9 Provide installation inspections required by public authorities.
.10 Repair or replace items damaged by Contractor or subcontractor on site.

.3 Schedule of Owner furnished items:

.1 C-1005Traffic Signs including posts, as indicated in the Contract Drawings.
.2 C-1005 Information Signs including posts, as indicated in the Contract Drawings.

1.9 EXISTING SERVICES

.1 There are no known utilities within the limits of this contract. This does not relieve the Contractor to strictly adhere to OH&S regulations and all that is required for utility investigation prior to any work.

.2 If utilities are encountered, immediately advise Departmental Representative and confirm findings in writing.

1.10 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each document as follows:

.1 Contract Drawings marked up with as-built information.

.2 Specifications.

.3 Addenda.

.4 Reviewed Shop Drawings and Mix Designs.

.5 List of Outstanding Shop Drawings.

.6 Change Orders.

.7 Other Modifications to Contract.

.8 Field Test Reports.

.9 Copy of Latest Approved Work Schedule.

.10 Manufacturers' Installation and Application Instructions.

.11 Environmental Protection Plan.

.12 Traffic Accommodation Strategy.

.13 Quality Management Plan.

.14 Health and Safety Plan and Other Safety Related Documents.

.15 Restricted Activity Permits.

.16 Other documents as specified.

1.11 SURVEY RESPONSIBILITIES

.1 The Contractor is responsible for all surveying required to construct the Work to the lines and grades shown on the Drawings. Survey Work must be tied to the nearest Alberta Survey Control Monument. Elevations shown on the Drawings are geodetic.

.2 The Contractor must conduct a survey circuit of the project monuments and submit a report to the Department Representative at least seven (7) days prior to installation of any works.

.3 The Contractor is responsible for quantity survey measurements for progress payment application.

.4 The Contractor will complete as-built survey of all Works for Record Drawings and provide the results to the Departmental Representative prior to Substantial Performance of the Work.

1.12 TRAFFIC ACCOMMODATION STRATEGY (TAS)

.1 The Contractor must prepare a traffic accommodation strategy for the project. The TAS must detail temporary construction signage and detours for public use of the park area during the construction work.

.2 No signs or advertisements, other than warning signs, are permitted on site.

.3 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall be diamond grade and shall conform to CAN3-Z321.

.4 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 the Departmental Representative.

.5 Signage shall be coordinated with other Contractors. Graphic “No Walking” and “No Vehicle” signs must be installed parallel to Highway 93 and placed 6 meters apart along the length of the existing TAS or directed by the Department Representative.

1.13 NATIONAL PARK REGULATIONS

.1 Contractor and all sub-contractors shall ensure that all work is performed in accordance with ordinances, laws, rules and regulations set out in the National Parks Act.

.2 Contractor and all sub-contractors shall obtain business licenses from Parks Canada Administration Office prior to commencement of work.

.3 Contractor and all sub-contractors shall comply with all laws and government regulations applicable to work under this contract.

.4 Contractor is responsible to ensure all sub-contractors comply with the National Park Regulations

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

.1 Construction shall commence with mobilization to site as weather permits. However, no later than July 6, 2020.

.2 All construction activities shall be completed by August 24, 2020.

.3 The site shall be closed to public throughout the construction period.

.4 Construction operations shall be schedule and conducted to cause minimal inconvenience to the public. Contractor shall be responsible for repairing any damage incurred to any portion of their access to the site, at the Contractor's cost.

.5 The Contractor is responsible for the development and supply of construction access to the Work as approved by the Departmental Representative.

1.2 USE OF THE SITE AND FACILITIES

.1 The Work Sites specified in the Contract shall only be used for the purposes of the Work.

.2 The Work Site shall be specified by Parks Canada and shall only be used for the purposes of the Work. The Work Site shall be made available by Parks Canada to the Contractor for its non-exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.

.3 Contractor shall maintain adequate drainage at the Work Site.

.4 The Contractor shall keep the Work Site clean and free from accumulation of waste materials and rubbish regardless of source. Snow shall be removed by the Contractor as necessary and at their cost for the performance and inspection of the Work.

.5 The Contractor shall provide sanitary facilities for work force in accordance with governing regulations and Section 01 35 43 - Environmental Procedures. The Contractor shall post notices and take such precautions as required by local health authorities and keep area and premises in sanitary condition.

.6 Any damage to the Work Site caused by the Contractor shall be repaired by the Contractor at their expense.

.7 Pets shall not be brought to or maintained at the construction site.

1.3 WORKING TIMES

.1 Work shall be permitted from Monday through Sunday, dusk to dawn.

.2 The Contractor shall not be permitted to work on any Alberta statutory holiday. The Contractor shall not haul or truck materials during any long weekend, beginning Friday at noon.

.3 Variance of the Working Times and any others are provided on the strict condition of satisfactory performance in all requirements as determined at the Departmental Representative's discretion and may be revoked at any time for any reason. It is provided on the presumption that no additional costs or any delay shall be attributed to Parks Canada in relation to conducting Works in accordance with the Variance and if that is not the case, the Contractor shall not commence work under the Variance. No claims for additional costs, delays, schedule impacts, loss of productivity or other extra Works resulting from a Variance shall be entertained

1.4 UTILITIES

.1 There are no known utilities within the limits of this project.

1.5 SURVEY OF EXISTING CONDITIONS

.1 Submission of tender is deemed to be confirmation that the Contractor has inspected the Site and is conversant with all conditions affecting execution and completion of work.

.2 The Contractor shall regularly monitor the condition of the Work Site and of property on and adjoining the Work Site throughout the construction period; and shall immediately notify the Departmental Representative if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, pathways, trails, walls, fences, slopes, light poles, sewers, culverts and landscaped areas.

.3 The Departmental Representative may, but shall not be obligated to, survey and record the condition of the Work Site and of property on or adjoining the Work Site prior to the commencement of construction by the Contractor. If requested and available, the Departmental Representative shall provide a copy of the survey records to the Contractor for reference.

.4 Whenever supplied with survey records, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative for any area before commencing construction in that area.

.5 Commencement of construction in any area shall be interpreted to signify that the Contractor has accepted such survey records as being a true record of the existing conditions prior to construction.

.6 The provision of the records of a survey of existing conditions by the Departmental Representative shall in no way limit or restrict the Contractor's responsibility to exercise proper care to prevent damage to all property within or adjacent to the Work Site, whether all such property is covered by the survey or not.

1.6 PROTECTION OF PERSONS AND PROPERTY

.1 The Contractor shall comply with all applicable safety regulations of WorkSafe AB and the Workers Compensation Act of Alberta including, but not limited to, Occupational Health and Safety Regulations and General Safety Regulations. Within the Site, under the Workers Compensation Act and the Occupational Health and Safety Regulation, the existing contractor is the designated Prime contractor.

.2 The Contractor will comply under the existing Prime Contractor in accordance with the Workers Compensation Act and Occupational Health and Safety Regulation Section 20.3 Coordination of multiple employer workplaces.

.3 Comply with all applicable safety regulations of the Workers' Compensation Board of Alberta (WCB) including, but not limited to, WCB's Industrial Health and Safety Regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations, when working in that province.

.4 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

.5 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.

.6 The Contractor shall promptly take such measures as are required to repair, replace or compensate for any loss or damage caused by the Contractor to any property or, if Parks Canada so directs, shall promptly reimburse to Parks Canada the costs resulting from such loss or damage.

.7 The Contractor shall be aware of adjacent work (Lower parking lot and Viewpoint).

1.7 USE OF PUBLIC AREAS

.1 Off-road construction equipment shall not be allowed outside the project limit of work, material loading areas, or alternate sites as designated and approved by the Departmental Representative.

.2 Asphalt, granular, embankment and excavation materials may be hauled on existing highway, but this shall be by standard highway trucks not exceeding legal highway load limits unless accepted in writing by the Departmental Representative.

.3 Flag persons shall be provided when vehicles are entering or exiting Work Site access points.

.4 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. Access and egress locations for the site shall have rig matting if work is to be completed during wet periods. All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Work Site and transporting materials shall be loaded in a manner that shall prevent dropping of materials or debris on the roadways and, where contents may otherwise be blown off during transit, such loads shall be covered by tarpaulins or other suitable covers. Spills of materials in public areas shall be removed or cleaned immediately by the Contractor at the cost of the Contractor. Heavy equipment work shall not be done during saturated ground conditions, as directed by the Departmental Representative. All activities shall be in accordance with Section 01 35 43 – Environmental Procedures and the Environmental Protection Plan prepared for the project.

1.8 SUBMITTALS

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

1.9 SUPERVISORY PERSONNEL

.1 When requesting a Preconstruction Meeting, in accordance with Section 01 31 00 - Project Management and Coordination, the Contractor shall submit to the Departmental Representative confirmation of the names of the supervisory personnel and other key staff designated for assignment on the Contract.

.2 At a minimum, the following personnel shall be included in the list:

.1 Contractor Manager

.2 Project Superintendent;

.3 Safety Representative;

.4 Quality Control Manager;

.5 Environmental Representative;

.6 Traffic Control Representative;

.3 The above personnel shall perform the following duties:

.1 Contractor Manager with full authority, as agent of the Contractor, to act on behalf of and legally bind the Contractor in connection with the Work and the Contract. The Contractor may, at its discretion, appoint one person as both Contractor Manager and Project Superintendent.

.2 The Project Superintendent shall be employed full time with full authority to supervise the Work, who shall be directly available to the Departmental Representative during all active periods of Work. Either they or their designated deputy shall be present on the Work Site each and every workday that Work is being performed, from the commencement of Work to Total Performance of the Work.

.3 The Project Superintendent shall nominate a Deputy Project Superintendent who shall have the authority of the Project Superintendent during the latter's absence.

.4 The Safety Representative shall possess a minimum of 2 years' construction safety supervisory experience. Their duties shall encompass all matters of safety activities from commencement of Work until the Substantial Performance of the Work.

.5 The Quality Control Representative shall be responsible for the development, implementation and execution of the Quality Management Plan and shall be the single point of contact for all quality related queries.

.6 The Traffic Control Representative shall be responsible for the development, implementation and execution of the Traffic Management Plan and shall be the single point of contact for all traffic control related queries.

.7 The Environmental Representative shall be responsible for the development, implementation and execution of the Environmental Protection Plan and shall be the single point of contact for all environmental related queries.

1.10 WASTE DISPOSAL

.1 All surplus, unsuitable and waste materials shall be removed from the Work Sites to approved sites outside the National Parks. Refer to Section 01 35 43 - Environmental Procedures.

.2 Deposit of any construction debris into any waterway is strictly forbidden.

.3 Cost for Waste Disposal described above shall be considered incidental to the Unit Price items and no additional payment shall be made.

1.11 **WORK STOPPAGE**

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

END OF SECTION

Part 1 General

1.1 MEASUREMENT FOR PAYMENT

.1 For each unit price item, Departmental Representative shall calculate payment based on tendered unit price and Departmental Representative's determination of units of work item completed.

.2 For lump sum price item, Departmental Representative shall calculate payment based on tendered price and Departmental Representative's estimate of percentage of work item completed.

.3 Where a method of measurement for payment for a work item is not specified, payment for that item shall be deemed to be incidental to the contract price.

.4 For each unit price item that requires survey for quantity verification, the Contractor shall submit all supporting survey data in electronic format to the Departmental Representative at least 7 days before submission of progress payment.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 SUMMARY

.1 This section prescribes the measurement and payment for items of Work described in the Bid Form. The measurement and payment clauses shall be read in conjunction with the various items of work listed in the Bid Form and the specifications contained herein.

3.2 GENERAL REQUIREMENTS

.1 **Mobilization and Demobilization**

Payment for this item shall be compensation in full for costs of mobilization; bonding; insurance; permits; moving personnel, equipment, fencing, safety measures, and materials to the site; setting up temporary facilities; project signage; public notices; storage of materials; all preparation for performing the work; full demobilization of the above; site clean-up; site restoration; and costs associated with the warranty period.

Payment: Lump sum price bid.

Measurement: The lump sum price bid for this work shall be relative to the costs involved but shall not exceed ten percent of the Tender Price; 50% of the lump sum bid shall be included in the first progress payment certificate; 50% of the lump sum price bid shall be included in the final progress payment certificate; Mobilization shall only be paid for as noted, regardless of the number of times the Contractor mobilizes and demobilizes, due to any condition or circumstance.

.2 Demolition

.1 **Remove and Dispose Existing Trail (Portion)**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply of all equipment, material and labour required to remove and dispose of a portion of the existing trail at the trailhead in between the Upper Parking Lot and the View point area. Upper Parking Lot as shown on the drawings including saw cut of adjacent asphalt; removal, hauling and disposing of paved trail; removal and disposal of any debris; backfilling with compacted native material, rehabilitation of disturbed area adjacent to the trail removal to match immediate surrounding terrain, cleaning; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

Payment: Unit price bid per square metre of existing asphalt trail.

Measurement: Field measured area.

.2 **Remove, Salvage, Relocate and Dispose Existing Features**

Payment: Lump sum price bid. Payment for this work comprises the following items, listed below.

Measurement: Lump sum payable based on the percentage of work complete.

.1 Remove and Relocate Existing Signs

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply of all equipment, material and labour required to remove and relocate all signs including traffic signs, information signs, trailhead signs, and other signs not specified elsewhere, as directed by the Departmental Representative, including concrete bases, posts and all hardware associated with the signs; backfilling with compacted native material, rehabilitation of disturbed area to match immediate surrounding terrain, cleaning; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.2 Remove and Dispose Existing Signs

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply of all equipment, material and labour required to remove and dispose signs as directed by the Departmental Representative, including concrete bases, posts and all hardware associated with the signs; backfilling with compacted native material, rehabilitation of disturbed area to match immediate surrounding terrain, cleaning; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.3 Remove and Dispose Existing Fences

Payment for this item shall be compensation in full for the Work required, including but not limited to removing and disposing the existing fence, demolishing and disposing of the existing base and all associated materials to an approved disposal site; backfilling with compacted native material, rehabilitation of disturbed area to match immediate surrounding terrain, cleaning; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.4 Remove and Relocate Existing Garbage Disposal

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply of all equipment, material and labour required to remove existing garbage disposal (waste receptacle), excavation, subgrade preparation, compaction, concrete slab on grade construction, and installation of the garbage disposal (waste receptacle) as indicated on the Drawings and in the Specifications, cleaning; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.5 Remove and Salvage Existing Vegetation

Payment for this item shall be compensation in full for the Work required, including but not limited to the removing, storing, and salvage of any existing vegetation (trees and shrubs). All labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.3 Site Furnishings

.1 **Supply and Install 1100 mm High Fences**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of 1100mm high fence complete with stanchions, planks, posts, and hardware; including all labour, equipment and materials, and any other incidental work for which payment is not specified elsewhere.

Payment: Unit price bid per linear metre of fence.

Measurement: Field measured length.

.2 **Supply and Install Benches**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of the benches complete with anchors, lumber, planks, posts, cast-in-place or pre-cast concrete platform, and hardware; including all labour, equipment and materials, and any other incidental work for which payment is not specified elsewhere.

Payment: Unit price bid per each bench installed.

Measurement: Field measured length.

.4 Site Furnishings – Washroom / Privy Structure

Payment: Unit price bid per washroom (privy) structure. Payment for this item shall be compensation in full for the Work required, including but not limited to the following items, listed below.

Measurement: Unit price payable based on the full completion of each unit specified.

.1 Hydraulic Testing of the New Privy Septic Tank

Payment for this item shall be compensation in full for the Work required, including but not limited to cleaning, supervision of water levels, disposal of potable water and additional fills required for retesting as indicated on the Drawings and in the Specifications; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.2 Cast-in-Place Concrete Piles Supporting Privy Structural Slab

Payment for this item shall be compensation in full for the Work required, including but not limited to the concrete and reinforcement as indicated on the Drawings and in the Specifications; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.3 Precast Concrete Walls, Structural Slab and Underground Septic Tank

Payment for this item shall be compensation in full for the Work required for the precast concrete perimeter walls, interior partition wall, structural slab, and underground septic tank for each privy structure, including but not limited to the design, supply, and installation of the precast elements as indicated on the Drawings and in the Specifications; excavation, backfill and compaction efforts required for installation of the precast elements as indicated on the Drawings and in the Specifications; sealants; all connectors and alignment pins to attach to each other and to the cast in place piles; temporary bracing; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.4 Wood Roof Joists and End Trusses

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of the joists and trusses as indicated on the Drawings and in the Specifications, complete with all required blocking, connectors and temporary bracing; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.5 Roof Sheathing

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of the sheathing as indicated on the Drawings and in the Specifications, complete with all required blocking, connectors and temporary bracing; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.6 Roof System

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of the roof system as indicated on the Drawings and in the Specifications, complete with all required trims, flashings, fasteners, ice and water shields, sealants, and 20ga roofing; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.7 Commercial Grade Man Doors

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of two commercial grade man doors (per washroom / privy structure) as indicated on the Drawings and in the Specifications, complete with all required trims, flashings, fasteners, jambs, frames, and hardware; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.8 Miscellaneous Items

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of the interior furnishings, exterior stone veneer, exterior vent pipe, bird mesh screens, skylights, paint, signs and panels for each washroom / privy structure as indicated on the Drawings and in the Specifications, complete with all required trims, flashings, fasteners, and hardware; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

.5 Earth and Surface Works

.1 **Strip Existing Vegetation and Topsoil**

Payment for this item shall be compensation in full for the Work required, including but not limited to the stripping of surface vegetation (grass), separating vegetation from topsoil and disposing of vegetation at an approved disposal site, stockpiling all topsoil onsite for reuse; all labour, equipment and materials required to complete the work; cleanup; and all other incidental work for which payment is not specified elsewhere.

Payment: Unit price bid per square metre of stripping.

Measurement: Field measured area.

.2 **Common Excavation**

Payment for this item shall be compensation in full for the Work required, including but not limited to excavation, removal and disposal, hauling, placing at stockpile, compaction at stockpile, any dewatering required before or during construction, levelling, grading, moisture conditioning, hauling to site for backfill, compacting of native fill; placing, compacting, moisture adjustment and finishing of materials in embankments labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Stripped ground survey must be completed prior to commencing grading activities. Survey data to encompass entire working limit.

Payment: Unit price bid per cubic meter of Common Excavation (material excavated, placed on-site and / or stockpiled).

Measurement: Volumes shall be calculated by surveyed cross sections completed by the Contractor and differential digital terrain models (DTMs) developed to calculate volume.

.3 **Supply and Install Granular Base Course**

Payment for this item shall be compensation in full for the Work required, including but not limited to supplying, loading, hauling, unloading, placement, levelling and compacting to the specified thickness and density; all labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Unit price bid per tonne of granular base course supplied and installed.

Measurement: Tonnage shall be verified by providing copies of the trucking tickets to the Departmental Representative.

.4 **Supply and Install Asphalt Paving – Parking Lot**

Payment for this item shall be compensation in full for the Work required, including but not limited to supply of all equipment, material and labour required for the preparation of the mix design and mix formula, milling of the existing pavement at all tie locations, the supply and placing of a prime coat and/or tack coat as required, supply of aggregates and asphalt cement, mixing, transporting, placing, spreading, compacting the asphalt concrete to the specified thickness and density; all labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere. Construction joints and adjustment of all utility structures to final elevations shall be considered incidental to paving.

Payment: Unit price bid per tonne of hot mix asphalt concrete measured in place.

Measurement: Tonnage shall be verified by providing copies of the trucking tickets to the Departmental Representative.

.5 **Supply and Install Asphalt Paving - Trail**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply of all equipment, material and labour required for excavation, subgrade preparation, compaction, supply of aggregates, root barrier and asphalt cement, mixing, transporting, placing, spreading, compacting the asphalt concrete to the specified thickness and density as indicated on the Drawings and in the Specifications, cleaning; and all labour, equipment and materials required to complete the work; and any other incidental work for which payment is not specified elsewhere.

Payment: Unit price bid per square metre of paved trail.

Measurement: Field measured area.

.6 **Asphalt Pavement – Surface Patching.**

Payment for this item shall be compensation in full for the Work required, including but not limited to supply of all equipment, material and labour required for the preparation of the mix design and mix formula, milling of the existing pavement at all tie locations, the supply and placing of a prime coat and/or tack coat as required, supply of aggregates and asphalt cement, mixing, transporting, placing, spreading, compacting the asphalt concrete to the specified thickness and density; all labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere. Construction joints and adjustment of all utility structures to final elevations shall be considered incidental to paving.

Payment: Unit price bid per tonne of hot mix asphalt concrete measured in place.

Measurement: Tonnage shall be verified by providing copies of the trucking tickets to the Departmental Representative.

.6 Traffic Control Features

Payment: Lump sum price bid. Payment for this item shall be compensation in full for the Work required, including but not limited to the following items, listed below.

Measurement: Lump sum payable based on the percentage of work complete.

.1 **Supply and Install Traffic Signs**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of permanent traffic signage; submission of sign proof for review and acceptance, posts and preparation work, post installation, moveable base; mounting hardware, surface restoration; all labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere. The permanent base will required and shop drawings for visualization of the signs will be reviewed and approved by the Departmental Representative.

.2 **Supply and Install Information and Directional Signs**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of the information signage and posts; installation of post; post excavation; supply and installation of concrete; mounting hardware; surface restoration; all labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

.3 **Supply and Install Pavement Marking**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and painting of all pavement markings including longitudinal and transverse marking lines, parking stalls, gored areas, "no parking" areas, "BUS" stall marking, and directional arrows; all labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

.4 **Supply and Install Low Profile Concrete Barriers (Curb Stops)**

Payment for this item shall be compensation in full for the Work required, including but not limited to the supply and installation of pre-cast, movable low profile concrete barriers (curb stops) complete with pins (two per curb stop); including protection of newly paved asphalt concrete pavement, all labour, equipment and materials, and any other incidental work for which payment is not specified elsewhere.

.5 **Install Asphalt Speed Hump**

Payment for this item shall be compensation in full for the Work required, including but not limited to the installation of asphalt speed hump complete with; including protection of asphalt concrete pavement; all labour, equipment and materials, and any other incidental work for which payment is not specified elsewhere. Payment for supply of asphalt will be made at unit bid item "Supply and Install Asphalt Paving".

.7 Landscaping

.1 **Supply and Install 1.5M Trees**

Payment for this item shall be compensation in full for the supply and installation of 1.5M trees including transportation and planting per contract documents; all labour equipment and materials required to complete the work; cleanup; watering and maintenance as described in the Specifications.

Payment: Unit price bid per each tree installed. Payment for this item shall be compensation in full for the Work required.

Measurement: Field Survey of each tree installed.

.2 **Supply and Install #2 Container Shrubs**

Payment for this item shall be compensation in full for the supply and installation of #2 container shrubs including transportation and planting per contract documents; all labour equipment and materials required to complete the work; cleanup; watering and maintenance as described in the Specifications.

Payment: Unit price bid per each shrub installed. Payment for this item shall be compensation in full for the Work required.

Measurement: Field Survey of each shrub installed.

.3 **Topsoil Placement**

Payment for this item shall be compensation in full for the Work required, including but not limited to the topsoil placement and fine grading of all shrub beds and seeded areas including all loading and hauling any stockpiled topsoil available for reuse, importing topsoil from offsite source as required, excavation, rough grading and placement to specified depths, fine grading and shaping, finishing, floating, removal or rocks and debris, nutrient testing of topsoil, soil amendments as required; all labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Unit price bid per cubic metre of topsoil placement.

Measurement: Field measured area times the specified topsoil placement.

.4 **Supply and Install Seed**

Payment for this item shall be compensation in full for the Work required, including but not limited to supplying seed, seeding, including preparing seed bed, applying seed and all incidental work for which payment is not specified elsewhere; all labour equipment and materials required to complete the work; cleanup; watering and maintenance as described in the Specifications.

Payment: Unit price bid per square metre of seeding.

Measurement: Field measured area.

END OF SECTION

Part 1 General

1.1 APPLICATIONS FOR PROGRESS PAYMENT

.1 Contractor's responsibilities:

.1 Make applications for payment on account monthly as Work progresses.

.2 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Work performed and products delivered to place of work at that date.

.3 Progress payment application to show estimate of percentage of work completed against each item of Lump Sum Price Breakdown.

.4 Progress payment application to include all labour and materials incorporated in Work and all materials stored at site.

.5 Progress payment application to include all agreed extras and deductions.

.6 Supply electronic copy of documentation to support payment application for materials on site in the form of itemized lists or unpriced purchase orders showing quantities.

.7 Supply other evidence required by Department Representative in support of progress claim including survey data.

.2 Departmental Representative’s responsibilities:

.1 Review Contractor's payment application within ten (10) working days following receipt of Contractor's payment application.

.2 Departmental Representative's estimate of percentage of work completed shall govern calculation of payment on all Progress Payment Certificates.

.3 Inform Contractor of amendments to claim by copy of Progress Payment. This work shall be incidental to contract and shall not be measured for payment.

1.2 SCHEDULE OF VALUES

.1 Provide schedule of values supported by evidence as Departmental Representative may reasonably direct and when accepted by Departmental Representative, be used as basis for applications for payment.

.2 Verify unit rate quantities with Departmental Representative on site.

.3 Include statement based on schedule of values with each application for payment.

.4 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Departmental Representative may reasonably require establishing value and delivery of products.

1.3 PROGRESS PAYMENT

.1 Progress payment submission to the Departmental Representative should match the structure of the Bid and Acceptance form.

.2 Contractor shall submit a Statutory Declaration and WCB (Workers Compensation Board) Clearance with each progress payment submission.

.3 No later than ten (10) days after receipt of an application for payment, if Departmental Representative amends application, Departmental Representative shall give notification in writing to the Contractor giving reasons for amendment.

.4 The Department will retain holdback in the amount of 10% of the value of each progress estimate.

1.4 CHANGE ORDERS

.1 Complete and promptly return all contemplated change notice requests issued by Departmental 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 Departmental Representative and Contractor.

1.5 SUBSTANTIAL PERFORMANCE OF WORK

.1 Prepare and submit to Departmental Representative comprehensive list of items to be completed or corrected and apply for a review by Departmental Representative to establish Substantial Performance of Work or Substantial Performance of designated portion of Work. Failure to include items on list does not alter responsibility to complete Contract.

.2 Departmental Representative shall state date of Substantial Performance of Work or designated portion of Work.

.3 Immediately following acknowledgment of Substantial Performance of Work, in consultation with Departmental Representative, establish reasonable date for finishing Work.

1.6 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

.1 After acknowledgment of Substantial Performance of Work:

.1 Submit application for payment of holdback amount, or partial holdback amount as deemed appropriate by Departmental Representative, as well as statutory declaration that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.

.2 After receipt of application for payment and sworn statement, Departmental Representative shall issue certificate for payment of holdback amount or partial holdback amount as recommended by consulting engineer.

1.7 FINAL PAYMENT

.1 Submit application for final payment when Work is completed.

.2 Departmental Representative shall review Work to verify validity of application. Departmental Representative shall give notification that application is valid or give reasons why it is not valid.

.3 Departmental Representative shall issue an acknowledgement and date for final for payment when application for final payment is found valid

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 MEASUREMENT AND PAYMENT PROCEDURES

.1 This Work shall be incidental to the Contract and shall not be measured for payment.

1.2 CHANGES TO DESIGN

.1 If a change from the Issued for Construction (IFC) design is accepted in writing by the Departmental Representative and agreed on by the Contractor, a design variance letter shall be issued by the Departmental Representative. The design variance letter must state what changes are being made from the IFC design and what the method of measurement for payment shall be, if varying from the Contract Documents.

.2 The design variance letter must be signed by both the Contractor's Representative and the Departmental Representative prior to performing the Work.

.3 The Departmental Representative reserves the right to use as-built survey or neat line measurements for payment if for any reason tolerances are not in accordance with the IFC design.

1.3 COORDINATION

.1 Perform coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work, with progress of Work of other Contractors, under instructions of the Departmental Representative.

1.4 PROJECT MEETINGS

.1 During the course of the Work, the Contractor shall schedule, chair and document weekly construction meetings, with attendance by the Departmental Representative.

.2 The agenda shall include and not limited to general construction, payment, scheduling, risk, quality, environmental, and safety management items as well as any other reasonably requested by the parities. Please refer to Section 01 31 19 1.3.5.

.3 The Contractor shall provide physical space and make arrangements for meetings at or near the Work Sites for all meetings that take place in relation to the Contract from their mobilization until their demobilization.

.4 Meetings held outside of the time noted above (before mobilization or after demobilization) shall be held in the local PCA Field Unit offices, as notified by the Departmental Representative.

.5 The Contractor shall attend or otherwise ensure the attendance of their responsible staff member(s), subcontractors, Departmental Representatives, suppliers, or other key parties all other meetings identified in the Contract or reasonably requested by the Departmental Representative in an effort to resolve specific issues as they may arise.

.6 Meetings shall be called and chaired by the Departmental Representative as required. The Contractor shall be represented at such meetings to the satisfaction of the Departmental Representative.

.7 As described in Section 01 35 43 – Environmental Procedures, an environmental briefing for all staff shall take place before beginning work at the site.

1.5 CONSTRUCTION ORGANIZATION AND START-UP

.1 Within three (3) days after award of Contract, the Departmental Representative shall request a Preconstruction meeting of Contract Representatives to discuss and resolve administrative procedures and responsibilities. Meeting shall be chaired by the Departmental Representative who shall prepare the minutes of the meeting.

.2 Departmental Representative, Contractor, major subcontractors, field inspectors and supervisors are to be in attendance.

.3 Agenda to include following:

- .1 Appointment of official representative of participants in Work.
- .2 Schedule of Work, progress scheduling in accordance with Section 01 32 16 – Construction Progress Schedules.
- .3 Schedule of submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .4 Requirements for temporary facilities, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 – Construction Facilities.
- .5 Site safety and security in accordance with Sections 01 14 00 – Work Restrictions, 01 35 29 – Health and Safety Requirements, 01 52 00 – Construction Facilities and 01 35 43 – Environmental Procedures.
- .6 Quality Control in accordance with Section 01 45 00 – Quality Control.
- .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
- .8 Owner-furnished materials.
- .9 Monthly progress claims, administrative procedures, photographs, and holdbacks.
- .10 Closeout procedures and submittals in accordance with Sections 01 77 00 –
- .11 Closeout Procedures and 01 78 00 – Closeout Submittals. Insurances and transcript of policies.
- .12 Other business.

.4 Comply with Departmental Representative's allocation of mobilization areas of site, for field offices and sheds, and for access, traffic, and parking facilities.

.5 Prior to commencing construction, the Contractor shall schedule an on-site meeting with the Departmental Representative to review EIA mitigations. A minimum of 5 days notice shall be required for this meeting.

.6 During construction, coordinate use of site and facilities through Departmental Representative's procedures for intra-project communications: submittals, reports and records, schedules, coordination of Drawings, recommendations, and resolution of ambiguities and conflicts.

.7 Comply with instructions of the Departmental Representative for use of temporary utilities and construction facilities.

.8 Coordinate field Departmental Representative and layout work with the Departmental Representative.

1.6 ON-SITE DOCUMENTS

.1 Maintain at job site, one copy each of the following:

.1 Contract Drawings, marked up with as-built information
.2 Specifications
.3 Addenda
.4 Reviewed Shop Drawings and Mix Designs
.5 List of Outstanding Shop Drawings
.6 Change Orders
.7 Other Modifications to Contract
.8 Field Test Reports
.9 Copy of Latest Approved Work Schedule
.10 Manufacturers' Installation and Application Instructions
.11 Environmental Protection Plan
.12 Traffic Accommodation Strategy
.13 Quality Management Plan
.14 Health and Safety Plan and Other Safety Related Documents
.15 Building Permits
.16 Restricted Activity Permits
.17 WHMIS
.18 Labour conditions and wage schedules
.19 Equipment rate schedule and applicable versions of the relevant rate guides

1.7 SUBMITTAL SCHEDULE

.1 In accordance with Section 01 33 00 – Submittal Procedures.

.2 Prepare a schedule of the required submissions and the date the submissions shall be made. Include columns for Actual Date of Submission, Review Comments Received, Final Submission and Final Acceptance Received. Provide this schedule to the Departmental Representative in PDF (OCR Accuracy) format.

.3 The Parks Canada Agency shall not be responsible for any construction delays resulting from delays in submission acceptance if the submittal dates shown in the Submittal Schedule are not achieved.

1.8 PROJECT SCHEDULES

.1 In accordance with Section 01 32 16 - Construction Progress Schedules.

1.9 SUBMITTALS

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

.2 Submit requests for payment for review, and for transmittal to Departmental Representative.

.3 Submit requests for interpretation of Contract Documents and obtain instructions through Departmental Representative.

.4 Process substitutions through Departmental Representative.

.5 Process change orders through Departmental Representative.

1.10 CLOSEOUT PROCEDURES

.1 In accordance with Section 01 77 00 - Closeout Procedures.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 The Contractor shall schedule and administer weekly project meetings throughout the progress of the Work.

.2 The Contractor shall prepare agenda for meetings.

.3 The Contractor shall distribute notice of each meeting five days in advance of meeting date to the Departmental Representative.

.4 The Contractor shall provide physical space to accommodate minimum six individuals and make arrangements for meetings.

.5 The Departmental Representative shall preside at meetings.

.6 The Contractor shall record the meeting minutes, include significant proceedings and decisions and identify actions by parties.

.7 The Contractor shall reproduce and distribute copies of minutes after meetings and transmit to meeting participants and, affected parties not in attendance.

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

1.2 PRECONSTRUCTION MEETING

.1 Within three (3) days after award of Contract, the Departmental Representative shall request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Representatives from Parks Canada Agency, Contractor, major Subcontractors and Departmental Representative shall be in attendance.

.3 The Departmental Representative shall establish time and location of meeting and notify parties concerned minimum five days before meeting.

.4 Agenda to include:

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

.2 Schedule of Work in accordance with 01 32 16.07 – Construction Progress Schedules.

.3 Schedule of submission of Shop Drawings. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

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

.5 Health and safety requirements.

.6 Traffic Accommodation Strategy.

.7 Environmental Protection Plan.

.8 Quality Management.

.9 Delivery schedule of specified equipment.

.10 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, administrative requirements.

.11 Owner provided products.

.12 Record Drawings in accordance with Section 01 33 00 - Submittal Procedures.

.13 Monthly progress claims, administrative procedures, photographs, hold backs.

.14 Appointment of inspection and testing agencies or firms.

.15 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and one week prior to project completion, progress meetings shall be scheduled weekly.

.2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.

.3 The Departmental Representatives shall notify parties of confirmed attendance minimum four (4) days prior to meetings.

.4 The Contractor shall record minutes of meetings and circulate to attending parties and affected parties not in attendance within three (3) days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedule.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Health and safety incidents or corrective actions.

.13 Traffic Accommodation.

.14 Erosion Control/Environmental Protection.

.15 Other business.

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 NOT USED.

END OF SECTION

Part 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 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.5 Master Plan: summary-level schedule that identifies major activities and key milestones.

.6 Milestone: significant event in project, usually completion of major deliverable.

.7 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.

.8 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 Ensure master plan and detail schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately five (5) working days, to allow for progress reporting.

.4 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative within five (5) working days of Award of Contract a Bar Chart (GANTT Chart) as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within two (2) working days of receipt of acceptance of Master Plan.

.4 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.5 Departmental Representative shall review and return revised schedules within two (2) working days.

.6 Revise schedule as required and resubmit within two (2) working days.

.7 Accepted revised schedule shall become Master Plan and be used as baseline for updates.

1.4 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.
.2 Submittal of Shop Drawings.
.3 Permits.
.4 Survey.
.5 Mobilization.
.6 Environmental Protection Plan (EPP), review and implementation.
.7 Health and Safety Plan, review and implementation.
.8 Traffic Accommodation strategy, review and implementation.
.9 Quality Management Plan.
.10 Construction work activities.
.11 Substantial Performance Inspection for each stage.
.12 Demobilization.
.13 Completion.

1.5 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on a weekly basis reflecting activity changes and completions, as well as activities in progress. Submission of the weekly project schedule will to be the Department Representative.

1.6 PROJECT MEETINGS

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

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

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

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

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

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

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

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

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

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

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

1.2 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 The shop drawings shall be stamped and signed by a Professional Engineer registered in the Province of Alberta, Canada.

.3 Allow five (5) days for Departmental Representative’s review of each submission.

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

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

.6 Accompany submissions with transmittal letter containing:

.1 Date.

.2 Project title and number.

.3 Specification section.

.4 Contractor's name and address.

.5 Identification and quantity of each shop drawing, product data and sample.

.6 Other pertinent data.

.7 Submissions include:

.1 Date and revision dates.

.2 Project title and number.

.3 Specification section.

.4 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.5 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.6 Details of appropriate portions of Work as applicable:

.1 Capacities.

.2 Performance characteristics.

.3 Standards.

.4 Relationship to adjacent work.

.8 After Departmental Representative’s review, distribute copies.

.9 Submit PDF of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings shall not be prepared due to standardized manufacture of product.

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

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

.12 The review of shop drawings by the Department Representative is for sole purpose of ascertaining conformance with general concept.

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

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

1.3 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpeg, standard resolution.

.2 Take photographs of site conditions before, during, and after construction. Take photographs of any unique or unusual items.

.3 Photographs shall also be included in the weekly progress reports.

.4 Photographs to be submitted on USB. All photographs to be labelled with meaningful titles as part of closeout package at project completion.

1.4 REQUIRED CONTRACTOR SUBMITTALS

.1 General

.1 This Clause identifies the plan, program, and documentation required prior to mobilization on site and during the construction phase.

.2 Pre-Mobilization Submittals

.1 Submit the following plans and programs to the Departmental Representative for review a minimum of five (5) days prior to mobilization to the project site. The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of the submittals in writing. The Contractor shall not construe the Departmental Representative's authorization of the submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety or environmental concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

.1 Construction schedule for all Work in accordance with Section 01 32 16.19 – Construction Progress Schedule.

.2 Construction Staging Plan.

.3 Environmental Protection Plan in accordance with Section 01 35 43 – Environmental Procedures.

.4 Traffic Accommodation Strategy in accordance with the requirements identified in Section 01 11 00 – Summary of Work.

.5 Quality Management Plan in accordance with Section 01 45 00 – Quality Control.

.6 Health and Safety Plan in accordance with Section 01 35 29.06 – Health and Safety Requirements.

.7 Submit site-specific Health and Safety Plan after date of award 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 operations found in the Work Plan.

.8 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to the Departmental Representative and the authority having jurisdiction weekly.

.9 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.10 Submit copies of incident and accident reports.

.11 Submit WHMIS Material Safety Data Sheets (MSDS) to the Departmental Representative.

.12 The Departmental Representative shall review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within five (5) days after receipt of plan. Revise plan as appropriate and resubmit plan to the Departmental Representative within five (5) days after receipt of comments from the Departmental Representative.

.13 The Departmental Representative's review of the 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.

.14 On site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

.3 Construction Phase Submittals

.1 Weekly Progress Reports that outline the Work completed to date as well as the anticipated Work to be performed for the following week on a day-by-day basis.

.2 Quality Control Inspection Reports – The Contractor shall maintain daily inspection reports that itemize the results of all Quality Control Inspections conducted by the Contractor. The reports shall be made available for review by the Departmental Representative upon request. A summary of all Quality Control inspections conducted to date shall be submitted by the Contractor with each payment request.

.3 Survey of all utilities in the work area via locates submitted to the Department Representative.

.4 Washroom building and septic tank shop drawings.

.5 Manufacturers product data, specifications, and certification for traffic signs and posts and line paint.

.7 Sieve analysis for aggregate base course and granular sub-base course as per Section 32 11 23 – Aggregate Base Courses.

.8 Asphalt concrete mix design and trial mix test results.

.9 Manufacturer's test data and certification that asphalt cement meets specified requirements prior to commencing work.

.4 Project Completion Submittals

.1 Record Documents in accordance with Section 01 78 00 - Closeout Submittals.

.2 Quality Assurance/Quality Control Records.

.3 Photo USB.

.4 Operating and Maintenance manuals, as a linkable document.

.5 Warranty Management Plan in accordance with Section 01 78 00 – Closeout Submittals.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 Related Requirements

.1 The Contractor shall provide traffic control in accordance with current edition of:

.1 Alberta Transportation Standard - Traffic Accommodation in Work Zones latest edition.

.2 Section 01 11 00 - Summary of Work

.3 Section 01 14 00 - Work Restrictions

.4 Special Provision

1.3 GENERAL

.1 The Contractor shall develop and implement a Traffic Accommodation Strategy (TAS) prior to commencement of the Work in accordance with the requirements of the current edition of the Alberta Transportation Standard – Traffic Accommodation in Work Zones, except where specified otherwise.

.2 The Contractor shall submit the TAS to the Departmental Representative for review within five (5) days of Contract award and prior to commencement of any work. The Departmental Representative shall provide review comments to the Contractor within two (2) days. If revisions to the TAS are requested, the Contractor shall resubmit the TAS to the Departmental Representative within two (2) days of receipt of comments.

.3 During execution of the Work, the Contractor shall be required to update the TAS if dictated by changes in site or working conditions, or if requested by the Departmental Representative.

.4 The Contractor shall design, supply, erect, move and maintain all traffic control devices, signs, temporary pavement markings, other safety measures and provide staff to ensure safe passage of all traffic from commencement of site work to date of acceptance by the Departmental Representative.

.5 All traffic and warning signs shall be either bilingual or of a symbolic or pictorial.

.6 The Contractor shall coordinate and maintain traffic management procedures with other Contractors working in the area for the duration of the contract.

1.4 PROTECTION OF PUBLIC TRAFFIC

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

.2 When working on existing travelled way:

.1 Place equipment in a position presenting a minimum of interference and hazard to traveling public.

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

.3 Do not leave equipment on travelled way overnight.

.4 Do not close any lanes of road without approval of Departmental Representative.

.5 Keep travelled way clean and of sufficient width to accommodate one 3.5 m wide lane for traffic.

.6 The traffic control measures shall be monitored by the Departmental Representative, who may require modifications of these measures from time to time to achieve satisfactory traffic flow, safety of traveling public and coordination with adjacent contracts.

1.5 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in the current edition of the Alberta Transportation Standard – Traffic Accommodation in Work Zones.

.3 Place signs and other devices in locations recommended in the current edition of the Alberta Transportation Standard – Traffic Accommodation in Work Zones.

.4 Continually maintain traffic control devices in use:

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

.2 Remove or cover signs which do not apply to existing conditions.

1.6 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag personnel, trained in accordance with, and properly equipped as specified in the current edition of the Alberta Transportation Standard – Traffic Accommodation in Work Zones, for situations as follows:

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

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

.3 Where temporary protection is required while other traffic control devices are being erected or taken down.

.4 For emergency protection when other traffic control devices are not readily available.

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulation

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.3 Province of Alberta

.1 Occupational Health and Safety Act, R.S.A. - Updated 2013.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within seven (7) days after award of contract 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 one (1) copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly, including minutes of safety toolbox meetings.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets to Departmental Representative.

.7 Submit an Emergency Response Plan to address any unforeseen or peculiar safety related factors, hazards or conditions during the performance of work. Advise the Departmental Representative immediately verbally and in writing if the Contractor identifies hazardous conditions.

.8 Departmental Representative shall review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within three (3) days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within two (2) days after receipt of comments from Departmental Representative.

.9 Departmental Representative’s review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.10 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.11 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

.1 Emergencies: In the event of emergency call 911

.2 All other inquiries: Parks Canada Switch Board (403) 762-4506.

.3 Contractor shall have a satellite phone on site at all times.

1.4 FILING OF NOTICE

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

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

.2 Conduct weekly safety meetings at the beginning of each week to discuss the scheduled work for that week and the associated safety hazards.

1.7 REGULATORY REQUIREMENTS

.1 Do work in accordance with Section 01 41 00 – Regulatory Requirements.

1.8 GENERAL REQUIREMENTS

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

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

1.9 RESPONSIBILITY

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

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

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with the latest version of the Occupational Health and Safety Act, General Safety Regulation, and Code, Alberta

.2 Comply with R.S.Q., c. S-2.1, an Act respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.

.3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.11 UNFORSEEN HAZARDS

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

1.12 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience
.2 Have working knowledge of occupational safety and health regulations.
.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
.5 Be on site during execution of Work and report directly to and be under direction of Registered Occupational Hygienist or site supervisor.

1.13 POSTING OF DOCUMENTS

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

1.14 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

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

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

1.15 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 All Contractor operations shall be performed in such a manner that no detritus from his operations shall enter any river, waterway, ditch, or wetland within Banff National Park.

.2 If, in the opinion of the Departmental Representative, full containment of Contractor's detritus is not being achieved, operations may be ordered halted until the situation is rectified.

.1 Contractor to adhere to requirements identified in the Parks Canada Basic Impact Analysis document provided as a reference document.

1.2 NATIONAL PARK REGULATIONS

.1 The Contractor shall ensure that all work is performed in accordance with the ordinances, laws, rules and regulations set out in the Canada National Parks Act and Regulations.

.2 The Contractor and any sub-Contractors shall obtain a business license from the Parks Canada Administration Office in Banff prior to commencement of the contract.

.3 All Contractor's business and private vehicles are required to obtain a vehicle work pass from Parks Canada. These permits must be obtained from the PCA Administration Office.

1.3 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)

.1 Execution of the Work is subject to the provisions within the Canadian Environmental Assessment Act (CEAA) 2012 and subsequent amendments.

.2 The Contractor is required to prepare an Environmental Protection Plan (EPP), which shall include the topics in the following sub sections.

.3 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.

.4 The Contractor shall notify the Departmental Representative in a reasonably timely manner of any actual or potential environmental incidents or failure of protection measures.

.5 The Contractor shall notify the Departmental Representative immediately of any violations of environmental approvals, permits, authorizations or EPP measures.

1.4 RELICS AND ANTIQUITIES

.1 Give immediate notice to Departmental Representative if evidence of archaeological finds are encountered during construction, and wait for written instructions before proceeding with Work in this area.

.2 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on the site shall remain the property of Parks Canada. Protect such articles and request directives from Departmental Representative.

.3 Provide forty-eight (48) hours notice Departmental Representative prior to commencing any work that may interfere with or affect any identified historical or archaeological site. Commence work only upon written instruction from Departmental Representative.

1.5 WILDLIFE

.1 Avoid or terminate activities on site that attract or disturb wildlife.

.2 Pets are not allowed on the work site, or in any administrative or laydown areas.

.3 All personnel shall be instructed by the Departmental Representative the procedures to follow in the event of wildlife appearance near or intrusion into the construction site. to attract or approach any wildlife seen near the site, and are to vacate their location in the event of aggressive behavior or persistent intrusion by bears, cougars, wolves, elk or moose. The Departmental Representative are to be notified about the circumstance immediately. The Banff warden services shall be called to determine the course of action. The general presence of wildlife observed near the construction site, any carcasses or unusual wildlife observations shall be reported to the Departmental Representative.

1.6 FIRE PROTECTION AND CONTROL

.1 A fire extinguisher shall be carried and available for use on each machine in the event of fire (e.g. ignited by a spark) to prevent the fire from burning the unit or spreading to other fuels in the work area. Basic firefighting equipment – e.g., three (3) shovels, two (2) pulaskis, and two (2) 20 litres backpack pumps shall be maintained at the construction site at a location known and easily accessible to all the Contractor's staff. Contractor's staff shall receive basic training in early response to wildfire events during the "environmental briefing".

.2 Machinery and equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.

.3 No smoking is allowed on the construction site to ensure that accidental ignition of any flammable material is prevented. Fires or burning of waste materials are not permitted.

.4 The Contractor shall maintain an awareness of the fire danger rating (Index) in the work area by contacting the Banff fire duty officer. Fire prevention care is to be commensurate with the Fire Index.

.5 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The Departmental Representative shall be notified of any fire immediately.

.6 Deliberately lighting of fires or burning of waste materials is strictly not permitted.

1.7 SITE ACCESS AND PARKING

.1 A plan detailing access to the construction site shall be prepared by the Contractor and included in the EPP. This includes access and facilities at the work sites and within the work limits, including day-to-day entry/egress and plans for delivery and approach for large dimension materials shall be anticipated and described. The access plan shall describe worker transportation to and from the construction site, and parking of workers' private vehicles. Specific details of any vehicles to transport workers to site or site equipment to be used on the trails are to be provided.

.2 Restrict vehicle movements to work limits.

.3 Do not park vehicles in areas beyond work limits, unless specifically authorized by the Departmental Representative.

.4 A construction office is anticipated for the work. The construction office may be located at the site area, actual location subject to the approval of the Departmental Representative. It is anticipated the construction office may comprise the Contractor's main office and a materials testing trailer.

.5 As an alternative to the above-mentioned locations, a Contractor's office and work headquarters may be established at another location at the discretion of the Departmental Representative. The Contractor shall prepare a plan regarding structures, equipment, waste materials management, water, power and sewage services, materials lay-down area, fuel storage, operations, etc. required at this location. The plan shall be subject to review and approval by the Departmental Representative. This site may be shared with other Contractors.

1.8 EROSION AND SEDIMENT CONTROL (ESC) PLAN

.1 The Contractor must prepare an ESC plan for the project to be included in the Environmental Protection Plan. The plan must detail temporary and permanent environmental control measures that the Contractor shall undertake to comply with all applicable legislation, regulations and approvals during the course of their construction. The plan should address the following items:

- .1 Pre-Construction Actions:
  - .1 Prepare and submit for review by Departmental Representative the "Environmental Protection Plan"
- .2 Construction Considerations:
  - .1 Clearing and excavation must start only after installing the sediment and runoff measures as per the plan which has been reviewed and accepted by the Departmental Representative. Only areas required for immediate construction activity and as approved by the Departmental Representative may be cleared. Additional control measures must be installed as excavation advances.
  - .2 Stockpiles can be located anywhere in the construction work areas approved by Departmental Representative. They must be stabilized against erosion immediately following stockpiling operations. Runoff from the stockpile areas must be contained to prevent contamination of drainage systems.
  - .3 Sediment and debris must be prevented from reaching waterways.
  - .4 Dust control measures must be implemented to prevent wind transport of dust from disturbed soil surfaces.
  - .5 On-going inspection and maintenance of Erosion and Sediment Controls must be performed by the Contractor until restoration is achieved.
- .3 Post-Construction Activities:
  - .1 All accumulated sediment and debris must be removed as required after construction activities are complete.
  - .2 Stockpile, storage and laydown areas must be cleaned and restored to pre-construction condition.
- .4 The ESC Plan must include natural area protection measures for natural areas impacted by the project.

1.9 DRAINAGE

.1 Provide temporary drainage and pumping required to keep excavations and site free from water.

.2 Prior to directing stored water off site, obtain approval from Departmental Representative and ESO.

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

1.10 SITE CLEARING AND PLANT PROTECTION

.1 Vegetation Clearing:

.1 Protect trees and plants on site and adjacent properties as shown in the Drawings.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.4 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.5 Minimize stripping of topsoil and vegetation.

.6 Restrict tree removal to areas indicated in Contract Documents.

.7 Tree and vegetation clearing must occur outside of Environment Canada’s restricted timing windows for migratory breeding birds, outside of May 1 to August 15

.8 If any vegetation clearing is proposed between May 1 and August 15, nest sweeps must be conducted seven to ten (7-10) days prior to clearing and grubbing activities.

.9 If any nest or dens are discovered during work, the area must be flagged and work temporarily ceased until Departmental Representative has taken appropriate action.

.10 All works shall be undertaken in a manner that prevents the introduction or minimizes the spread of invasive alien species and noxious weeds.

.2 Soil Stripping

.1 Soil horizons must be excavated and stored separately. Organics and topsoil should be salvaged and replaced in the reverse order of excavation over mineral soils during re-contouring activities, wherever possible.

.2 Soils must be stored in separate piles on an impervious surface within temporary workspaces approved by the Departmental Representative. If soil storage is required for an extended period (greater than seven (7) days) or if heavy rain or wind is forecast, soil piles must be covered to reduce erosion loss.

1.11 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment in accordance with local authorities' emission requirements.

.3 Spills or releases of hazardous materials or deleterious substances that may cause damage to the environment or human health shall be immediately reported to Departmental Representative and, if required, to the Provincial authority.

.4 The Contractor shall take all reasonable measures to contain all spills. The Contractor shall contain, collect and dispose of spilled products at their expense.

.5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.6 All equipment must be properly maintained, in sound mechanical condition and free of any fuel, oil, and hydraulic fluid or coolant leaks.

.7 Equipment must be free of external grease, loose dirt or oil and the machinery must be pressure washed prior to the start of the project.

.8 All machinery must be equipped with emergency spill kits large enough to contain 110% of any possible spills or leaks of oil, fuel, hydraulic fluid or coolant during the project.

.9 The operators of the equipment must be familiar with how to properly use the spill kits in the event of an emergency.

.10 Fuel, oils, lubricants, chemicals, and any potentially hazardous material must not be dispelled into the environment.

.11 Machinery and vehicles must keep to roads, trails, or designated temporary workspaces and turnaround points. The Departmental Representative shall identify approved off-workspaces.

.12 Rutting and/or compaction of ground surfaces should be avoided as much as possible by keeping to designated work areas and away from wet locations.

.13 All areas with rutting damage or noticeable compaction from heavy equipment must be re-graded and back-filled if necessary.

.14 Any holes or depressions caused by site preparation or construction shall be back-filled and compacted to an appropriate degree.

1.12 CONTRACTOR'S OPERATIONS

.1 Confine all operations to the work areas designated by the Departmental Representative. No activities of any kind may be carried out beyond those work areas without the written permission of the Departmental Representative.

.2 Do not store or stockpile construction materials in the trees bordering or being preserved on site. Do not unreasonably encumber the site with products.

.3 Provide sufficient sanitary facilities and maintain in a clean condition.

.4 Conduct operations at all times in such a manner as to preserve the natural features and vegetation in the area. Cut and fill slopes shall be blended with adjoining topography. Material from fill slopes shall not be permitted to slough or roll into surrounding tree cover or to bury any plant material designated to be retained.

.5 When in the opinion of the Departmental Representative, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the staked or designated work area, the Contractor shall be responsible, at his expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative.

.6 Failure to comply with or observe environmental protection requirements as identified in these specifications may result in work being suspended pending rectification of the problems and operators of equipment being charged under the National Park Act.

1.13 START- UP AND ENVIRONMENTAL BRIEFING

.1 All staff employed at the construction site shall attend an orientation conducted by the Contractor regarding their individual and collective responsibilities, to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. Employees must attend this briefing before beginning their work at the site. Each employee, having received the environmental briefing, shall be issued a certification sticker to be displayed on their helmet. Employees of other service and materials providers who attend at the site – e.g., concrete truck operators, crane operators, and truck drivers must be apprised of their duty not to cause adverse environmental impact.

.2 Parks Canada shall have an ESO attending the site to monitor the construction activity for conformance with the EPP. The ESO or alternate designated Parks Canada staff member shall present the "environmental briefing". The ESO's main duties are to monitor the progress of the construction on an on-going basis to ensure compliance with environmental protection measures, and to provide guidance through the Departmental Representative, in the event of unanticipated environmental problems. Although the ESO has authority to enforce National Parks Act violations, direction to the Contractor shall be the duty of the Departmental Representative.

1.14 HAZARDOUS PRODUCTS AND MATERIALS

.1 A list of products and materials to be used or brought to the construction site that are considered or defined as hazardous to the environment shall be presented in the EPP. Such products include, but are not limited to; grout, fuel, concrete finishing agents, paint, etc. A plan detailing the containment and storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the application of these products shall be presented in the EPP.

.2 Hazardous products shall be stored no closer than 100 m from any waterway.

.3 MSDS sheets for hazardous material are to be provided in a location accessible to all workers.

1.15 EQUIPMENT FUELLING AND MAINTENANCE

.1 A fuel delivery, storage and distribution plan shall be submitted. Topics to be addressed in the EPP shall include, but not necessarily be limited to:

.1 Diesel and gasoline supply vehicles, including bulk tankers shall be parked more than 100 m from rivers.

.2 Fuel tanks with manual or electric pump delivery systems shall be used, gravity feed is not allowed.

.3 Fuelling personnel shall maintain immediate attention to and presence at the fuelling operation.

.4 Fuelling sites shall be identified by the Contractor in the EPP.

.5 Lubricant changes and minor repairs shall be conducted at a location identified by the Contractor in consultation with the ESO. Waste lubricants, used filters and other waste maintenance products shall be removed from Banff National Park to recycling or certified disposal sites.

.6 Equipment shall be inspected daily for fluid/fuel leaks and maintained in good working order.

.7 Equipment to be used on the project site shall be thoroughly cleaned of soil, seeds and any debris or external contaminants outside the national park before delivery to the work site.

1.16 WASTE MATERIAL STORAGE AND REMOVAL

.1 The Contractor shall prepare a Construction and Waste management plan as a part of the EPP. The Plan shall include the following basic principle:

.1 Waste reduction which follows the 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.2 Wastes generated at the construction site are to be contained and removed in a timely and approved manner. The EPP shall detail the waste management procedures, including the following:

.1 Describe the management of waste.

.2 Construction wastes shall be stored in containers at an approved location and removed promptly when the containers are 90% full.

.3 A concerted effort to reduce, reuse and recycle materials is expected.

.4 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.5 Provide containers to deposit recyclable materials.

.6 Transport all recyclable materials to an approved recycling facility off site.

.7 Waste materials are to be disposed at a certified construction waste landfill outside Banff National Park. No burying, burning or discarding of waste materials shall be permitted at the construction site, or elsewhere in Banff National Parks.

.8 No materials attractive to wildlife are to be stored at the site overnight – daily removal is mandatory. Human food products are to be contained in a manner so as not to attract animals, disposed of in bear proof containers, and waste food stuffs are to be removed from the construction site every day.

.9 Portable container toilets are to be provided in sufficient numbers and locations to ensure convenient usage including frequency of pump out.

.3 All garbage must be stored and handled in conformance with the National Parks' Garbage Regulations.

.4 No food, domestic garbage or hazardous wastes may be deposited in the trade waste site.

.5 Dispose of all hazardous wastes in conformance with the Environmental Contaminates Act and applicable provincial regulations while observing the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.

.6 Provide bear proof garbage containers on-site for domestic garbage generated on-site by Contractor's personnel and make arrangement for collection and disposal on a daily basis or when directed by the Departmental Representative.

.7 Maintain the site in a tidy condition, free from the accumulation of waste products, debris and litter.

.8 Do not dispose of or allow dispersing waste or volatile materials such as mineral spirits, oil or paint thinners or other hazardous wastes into waterways. Provide clean- up equipment and adequate supply of absorbent material on-site.

1.17 NOTIFICATION

.1 Departmental Representative shall 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 Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative shall issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 CLEANING

.1 Leave Work area clean at end of each day as per Division 01.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment from the work site.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 DEFINITIONS

.1 Quality Control (QC): The process of checking specific product or services to determine if they comply with relevant quality standards and identify ways to eliminate causes of unsatisfactory product or service performed. All material testing required is QC testing. All QC testing is to be conducted and paid by the Contractor.

.2 Quality Assurance (QA): The process of ensuring that the Contractor's Quality Management Plan (QMP) (QC, non-conformances, etc.) is being followed. The results of the QA are provided as feedback to both the Contractor and the Departmental Representative. Where required, the Contractor shall implement changes to the project based on the feedback received from the QA process.

1.3 QUALITY MANAGEMENT PROGRAM

.1 The Contractor shall prepare a Quality Management Plan. The purpose of the plan shall be to ensure the performance of the Work in accordance with Contract requirements.

.2 The Contractor shall submit the Quality Management Plan to the Departmental Representative prior to construction starting for acceptance in accordance with Section 01 33 00 - Submittal Procedures. The Plan shall develop a logical system for tracking and documenting the Quality Control of the Work as well as the Contractor's internal Quality Assurance procedures to verify the compliance of the Quality Control process. A systematic format and a set of procedures patterned on a recognized Quality Control Standard shall be acceptable, subject to review by the Departmental Representative.

.3 The Contractor shall appoint qualified and experienced Quality Control and Quality Assurance Personnel, who are dedicated to quality matters and who shall report regularly to the Quality Control Manager and Quality Assurance Manager as well as Contractor's management at a level which shall ensure that Quality Control and Quality Assurance requirements are not to be subordinated to manufacturing, construction or delivery. The Quality Control and Quality Assurance Personnel shall be empowered by the Contractor to resolve quality matters. Personnel involved in Quality Assurance shall be independent of the Quality Control Process.

.4 The Quality Management Plan shall include samples of all forms to be filled in by the Quality Control and Assurance Personnel. All forms shall be signed by the Quality Control Manager and Quality Assurance Manager and submitted promptly to the Departmental Representative.

.5 The Quality Management Plan shall include:

.1 Distribution list, providing a list of names to whom the Plan shall be distributed.

.2 Title page, identifying the Contract, Contractor and copy number.

.3 Revision page, identifying the revision number and date of the Plan.

.4 Table of Contents.

.5 Revision control, tabulating the revision number, date of revision, description of revisions and authorized signature.

.6 Details of measuring and test equipment including methods and frequency of calibration.

.7 Purchasing details of all materials and equipment including procurement documents and vendor's Quality Control Program standards.

.8 Procedures for inspection of incoming items, in-process inspection and final inspection and tagging of all supply items.

.9 Details of special processes as identified by the Departmental Representative, including qualifications of personnel and certification.

.10 Procedures for shipping, packaging and storage of materials.

.11 Procedures for maintaining quality records and Statements of Compliance, including filing and storage of documents for a period of one year after Completion of the Works.

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

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

.14 Forms used to ensure the application of the inspection and test checklist requirements. These forms shall be identified in the checklists and describe all testing requirements for Specification compliance.

.15 Details of the Quality Assurance Program including the Contractor's procedures to verify the compliance to the Quality Control process of on-site work and off-site work by fabricators.

.6 The Contractor must facilitate any independent Quality Assurance checks by representatives designated by the Departmental Representative.

.7 At completion of the Work a bound and itemized copy of all Quality Control and Quality Assurance documents and reports shall be prepared by the Contractor's Quality Control Manager and Quality Assurance Manager and submitted to the Departmental Representative.

1.4 TESTING

.1 Testing required to provide Quality Control and Quality Assurance to assure that the Work strictly complies with the Contract requirements shall include, but not be limited to:

.1 Granular, concrete, and asphalt materials and compaction testing; subgrade compaction testing; and all source acceptance testing;

.2 Hydraulic testing and cleaning of the precast septic tanks;

.3 All testing specified in the Contract Documents; and

.4 Any other testing required as a condition for deviation from the specified Contract procedures.

.2 The quality control testing proposed and testing frequency shall at a minimum, achieve the requirements of the following:

.1 The testing requirements in the 2013 Alberta Transportation Standard Specifications for Highway Construction Manual and subsequent updates.

.2 Wherever these standard specifications refer to standards (e.g., CSA, ASTM, and others) the minimum testing frequencies in these standards shall be utilized.

.3 The Contractor must satisfy themselves that the test frequencies being completed are sufficient to ensure the quality requirements of the QMP.

.3 The Contractor shall be fully responsible and bear all costs for all quality control testing and shall conduct such testing in the following manner:

.1 Provide testing facilities and personnel for the tests and inform the Departmental Representative in advance to enable the Departmental Representative to witness the tests if it so desired;

.2 Notify the Departmental Representative when sampling shall be conducted;

.3 Within one day after completion of testing, submit test results to the Departmental Representative; and

.4 Identify test reports with the name and address of the organization performing all tests, and the date of the tests.

.4 Approval of tested samples shall be for characteristics or use named in such approval and shall not change or modify any Contract requirements.

.5 Testing agencies, their inspectors, and their representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the Contract Documents, nor to approve or accept any part of the Work.

.6 The Contractor shall be responsible for third party testing of materials incorporated into the works.

.7 The Departmental Representative may perform quality audits as desired. Such audits shall not relax the responsibility of the Contractor to perform work in accordance with Specifications. To facilitate this work the Contractor shall:

.1 Notify Departmental Representative in advance of work which the Departmental Representative may want to test.

.2 Submit samples and/or materials required for testing, as specifically requested in the Specifications or as requested by the Departmental Representative. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the work.

.8 Provide labour and facilities to obtain and handle samples and materials on site.

1.5 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative 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 Departmental Representative shall order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.6 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies shall be engaged by the Departmental Representative for purpose of inspecting and/or testing portions of Work.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency shall request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.7 ACCESS TO WORK

.1 Allow Departmental Representative, PCA and inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.8 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, 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.

1.9 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

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

1.10 REPORTS

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

.2 Provide copies to subcontractor of work being inspected or tested.

1.11 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 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 within the work limits defined on the drawings.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work prior to the date specified for Final Completion in Section 01 11 00 - Summary of Work.

1.4 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 shall endanger Work.

1.5 CONSTRUCTION PARKING

.1 Parking shall be permitted on paved areas within the site. Parking shall not disturb further areas.

.2 Parking areas shall be approved by Departmental Representative.

1.6 SECURITY

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

1.7 OFFICES

.1 If required by Contractor, provide office of sufficient size to accommodate required work activities of Contractor and all Sub-Contractors. Departmental Representative to approve location of trailer. The Departmental Representative shall not require an office.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 The Contractor is responsible for supplying and paying for power, telecommunications and water required for the execution of the Work.

1.8 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.

1.9 SANITARY FACILITIES

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

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.10 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide measures to ensure the entrance and access road to the Peyto Lake Day Use Area is completely blocked at its intersection with Highway 93 so that visitors and the travelling public are prevented from accessing the site.

.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 is responsible for repair of damage to roads caused by construction operations.

.4 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.5 Dust control: adequate to ensure safe operation at all times.

.6 Provide snow removal during period of Work.

1.11 CLEAN-UP

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

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 The Contractor to coordinate with the Departmental Representative for the available locations for storing new or salvaged material.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work prior to the date specified for Final Completion in Section 01 11 00 - Summary of Work.

.3 Install barriers to protect trees and plants designated to remain as per Section 01 35 43 - Environmental Procedure.

1.3 GUARD RAILS AND BARRICADES

.1 Provide secure barricades or as directed by the Departmental Representative around deep excavations.

1.4 ACCESS TO SITE

.1 In accordance with Section 01 14 00.

.2 Provide and maintain signs and barricades or as directed by the Departmental Representative to ensure the entrance to the Peyto Lake Day Use Area access road is blocked from the entrance of the lower parking lot to ensure no site access for visitors or the travelling public; access to the Upper Parking Lot.

1.5 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, barricades, flares, and lights or as directed by the Departmental Representative to perform Work and protect public.

1.6 FIRE ROUTES

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

1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 REFERENCES

.1 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.2 Conform to latest date of issue of referenced standards in effect on date of submission of tenders, except where specific date or issue is specifically noted.

.2 Cost for such testing shall be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.3 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 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, shall 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 Departmental 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, or when located in mechanical or electrical rooms.

1.4 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental

Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 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 and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

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

1.7 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.8 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.9 CO-ORDINATION

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

1.10 SETTING OUT OF WORK

.1 Contractor shall set grades and layout work in detail from control points as shown on the Drawings.

.2 Contractor shall employ competent survey staff for complete detailed layout of work.

.3 Survey supervisor shall have experience in field survey work, including obtaining horizontal and vertical measurements, record keeping and calculation of quantities, generally associated with 3 to 5 years related experience.

.4 Contractor shall be responsible for correction of any error associated with his layout.

.5 Contractor shall supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.

.6 Contractor shall supply stakes and other survey markers required for laying out the work.

.7 Cost of setting out of work shall not be paid for directly but shall be considered incidental to contract unit prices tendered.

1.11 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.12 REMEDIAL WORK

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

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

1.13 EXISTING UTILITIES

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Existing survey control points and property limits as indicated on Contract Drawings.

1.2 QUALIFICATIONS OF SURVEYOR

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

1.3 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

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

.3 Make no changes or relocations without prior written notice to Departmental Representative.

.4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control.

1.4 SURVEY REQUIREMENTS

.1 Establish two (2) permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.2 Establish lines and levels, locate and lay out, by instrumentation.

.3 Stake for grading, fill and topsoil placement and landscaping features.

.4 Stake slopes.

.5 Stake batter boards for foundations.

1.5 EXISTING SERVICES

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

.2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.7 RECORDS

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

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

1.8 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

1.9 SUBSURFACE CONDITIONS

.1 Promptly notify Departmental 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 Consultant determine that conditions do differ materially, instructions shall be issued for changes in Work as provided in Changes and Change Orders.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 43 - Environmental Procedure

.2 Section 01 74 19 - Waste Management and Disposal

1.2 PROJECT CLEANLINESS

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

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas as agreed with the Departmental Representative.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site “Bear Proof” containers for Contractor use for collection of waste materials and debris.

.6 Any food and drinks waste must be disposed of in the provided “Bear Proof” containers immediately. Storage of any food and/ or drinks will be kept in vehicles or trailers.

.7 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.

.8 Dispose of waste materials and debris Section 01 74 19 - Waste Management and Disposal.

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

.10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.11 Provide adequate ventilation during use of volatile or noxious substances.

.12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.13 Schedule cleaning operations so that resulting dust, debris and other contaminants shall not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental. Do not burn waste materials on site, unless approved by Departmental Representative.

.5 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.6 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, and walls.

.7 Clean lighting reflectors, lenses, and other lighting surfaces.

.8 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.9 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.10 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.11 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.12 Remove dirt and other disfiguration from exterior surfaces.

.13 Clean and sweep roofs, gutters, areaways, and sunken wells.

.14 Sweep and wash clean paved areas.

.15 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.16 Clean roofs, downspouts, and drainage systems.

.17 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.18 Remove snow and ice from access to building.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill and includes the following:

.1 Preparation of a Draft Construction Waste Management Plan that shall be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.

.2 Preparation of a Construction Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.

.3 Preparation of monthly progress reports indicating cumulative totals representing progress towards achieving diversion and reduction goals of waste materials away from landfill and identifying any special programs, landfill options or alternatives to landfill used during construction.

.4 Preparation of a Construction Waste Management Report containing detailed information indicating total waste produced by the project, types of waste material and quantity of each material, and total waste diverted, and diversion rates indicated as a percentage of the total waste produced.

.2 This project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 RELATED REQUIREMENTS

.1 Section 01 52 00 - Construction Facilities

.2 Section 02 41 13 - Selective Site Demolition

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM E 1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program

.2 Recycling Certification Institute (RCI):

.1 RCI Certification Construction and Demolition Materials Recycling

1.4 DEFINITIONS

.1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.

.2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, re modeling, repair and demolition operations.

.3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.

.4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.

.5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

.8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the project site.

.11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

.12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.

.13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.14 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings;

.2 Wood preservatives; strippers and household cleaners;

.3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.

.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

.18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.

1.6 SUBMITTALS

.1 Provide required information in accordance with Section 01 33 00 - Submittal Procedures.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Consultant a preliminary analysis of anticipated site generated waste by listing a minimum of three (3) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that shall be used to divert construction waste from landfill and source reduction strategies; Consultant shall provide commentary before development of Contractor's Construction Waste Management Plan.

.3 Construction Waste Management Plan (CWM Plan): Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:

.1 Material Streams: Analysis of the proposed jobsite waste being generated, including material types and quantities forming a part of identified material streams in the Draft CWM Plan; materials removed from site destined for alternative daily cover at landfill sites and land clearing debris cannot be considered as contributing to waste diversion and shall be included as a component of the total waste generated for the site.

.3 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.4 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.

.5 Landfill Materials: Identify materials that cannot be recycled, reused or composted and provide explanation or justification; energy shall be considered as a viable alternative diversion strategy for these materials where facilities exist.

.6 Landfill Options: The name of the landfill where trash shall be disposed of; landfill materials shall form a part of the total waste generated by the project.

.7 Materials Handling Procedures: A description of the means by which any recycled waste materials shall be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

.8 Transportation: A description of the means of transportation of the recyclable materials, whether materials shall be site separated and self hauled to designated centers, or whether mixed materials shall be collected by a waste hauler and removed from the site, and destination of materials.

1.7 PROJECT CLOSEOUT SUBMISSIONS

.1 Record Documentation: Submit as constructed information in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 Construction Waste Management Report (CWM Report): Submit a CWM Report for this project in a format acceptable to submittal requirements and that includes the following information:

.1 Accounting: Submit information indicating total waste produced by the project.

.2 Composition: Submit information indicating types of waste material and quantity of each material.

.3 Diversion Rate: Submit information indicating total waste diverted from landfill as a percentage of the total waste produced by the project.

.4 Transportation Documentation: Submit copies of transportation documents or shipping manifests indicating weights of materials, and other evidence of disposal indicating final location of waste diverted from landfill and waste sent to landfill.

.5 Alternative Daily Cover (ADC): Submit quantities of material that were used as ADC at landfill sites, and that form a part of the total waste generated by the project.

.6 Multiple Waste Hauling: Compile all information into a single CWM Report where multiple waste hauling and diversion strategies were used for the project.

.7 Photographs: Submit photographs of waste diversion facilities documenting location and signage describing usage of waste separation containers.

1.8 QUALITY ASSURANCE

.1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:

.1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.

.2 Certifications: Provide proof of the following during the course of the Work:

.1 Compliance Certification: Provide proof that recycling center is third party verified and is listed as a Certified Facility through the registration and certification requirements of the Recycling Certification Institute.

1.9 **DELIVERY, STORAGE AND HANDLING**

.1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 (CWM PLAN) IMPLEMENTATION

.1 Manager: Contractor is responsible for designating an on site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.

.2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Departmental Representative, the Consultant and other site personnel as required to maintain CWM Plan.

.3 Instruction: Provide on site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.

.4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:

.1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.

.5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:

.1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Departmental Representative, Contractor and Consultant.

.2 Monthly waste summary shall contain the following information:

.1 The amount in tonnes or m^3 and location of material landfilled,

.2 The amount in tonnes or m^3 and location of materials diverted from landfill, and

.3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

3.2 SUBCONTRACTOR'S RESPONSIBILITY

.1 Subcontractors shall cooperate fully with the Contractor to implement the CWM Plan.

.2 Failure to cooperate may result in the Owner not achieving their environmental goals, and may result in penalties being assessed by the Contractor to the responsible Subcontractor's.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

- .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
  - .2 Request Departmental Representative's inspection.
- .2 Departmental Representative's Inspection:
  - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
  - .2 Contractor to correct Work as directed.
- .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
  - .1 Work: completed and inspected for compliance with Contract Documents.
  - .2 Defects: corrected and deficiencies completed.
  - .3 Equipment and systems: tested, adjusted and fully operational.
  - .4 Certificates required by Utility companies: submitted.
  - .5 Operation of systems: demonstrated to PCA personnel.
  - .6 The contractor must supply all Operations and Maintenance Manuals for any equipment as part of the contract.
  - .7 Work: complete and ready for final inspection.
- .4 Final Inspection:
  - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
  - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
- .6 Commencement of Lien and Warranty Periods: Departmental Representative's date of acceptance of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

.1 Undertake a final cleaning of the site at project completion:

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 All disturbed areas shall be returned to their original condition or directed or to satisfaction of the Departmental Representative.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Departmental Representative, to:

.1 Verify Project requirements.

.2 Review warranty requirements.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

.2 Post-warranty Meeting:

.1 Convene meeting two months prior to warranty completion, to

.1 Review of workmanship of warranty defects.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 One week prior to Substantial Performance of the Work, submit to the Departmental Representative, two final copies of operating and maintenance manuals in English, one as a linkable and searchable electronic document on USB.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.4 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf [219 x 279] mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content under Section numbers and sequence of Table of Contents.

.6 Text: manufacturer's printed data, or typewritten data.

.7 Drawings and Instructional Manual: provide with reinforced punched binder tab. Provide another copy as a linkable and searchable electronic document on USB.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, at site for Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

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

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

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

.1 Provide files, racks, and secure storage.

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

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

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

.1 Do not use record documents for construction purposes.

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

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of drawings, provided by Departmental Representative.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

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

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.2 Measured locations of internal utilities and appurtenances referenced to visible and accessible features of construction.

.3 Field changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.7 The Contractor shall complete as-built survey of all Works for Record Drawings and provide the results to the Departmental Representative prior to Substantial Performance of the Work.

.8 The acceptance of work and final inspection shall be in accordance to Section 01 77 00 – Closeout Procedures.

.9 Provide digital photos, if requested, for site records.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes descriptions for demolishing, salvaging for re-use, recycling and removing site work items identified for removal in whole or in part, and for backfilling trenches and excavations resulting from site demolition activities.

1.2 RELATED REQUIREMENTS

.1 Section 01 74 19 – Waste Management and Disposal

1.3 REFERENCE STANDARDS

.1 Department of Justice Canada (Jus)

- .1 Canadian Environmental Assessment Act (CEAA), 2012
- .2 Canadian Environmental Protection Act (CEPA), 2012
  - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations
  - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
  - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
  - .4 Motor Vehicle Safety Act (MVSA), 1995
  - .5 Hazardous Materials Information Review Act, 1985

.2 U.S. Environmental Protection Agency (EPA)

- .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles
- .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles
  - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices

1.4 DEFINITIONS

.1 Selective Demolition: Sequencing demolition activities to allow separation and sorting of selected site materials.

.2 Hazardous Substances: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

.3 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 19- Construction Waste Management and Disposal and as follows:

.1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.

.4 Waste Management Coordinator (WMC): contractor's representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.5 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Waste Management and Disposal.

.6 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with Departmental Representative for the material ownership including the following:

.1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

.2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during demolition remain Owner's property:

.1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Departmental Representative.

.2 Pre-Demolition Meetings.

.1 Convene pre-installation meeting week before beginning work of this Section, with Departmental Representative to:

.1 Verify project requirements.

.2 Verify existing site conditions adjacent to demolition work

.3 Coordinate with other construction sub trades

.4 Examine existing site conditions adjacent to demolition work, prior to start of Work

.5 Waste reporting requirements

.2 Ensure key personnel attend.

.3 WMC shall provide verbal report on status of waste diversion activity at each meeting.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Shop Drawings:

.1 Submit for review and approval selective site demolition drawings, diagrams or details showing sequence of selective site demolition.

.2 Schedule of Selective Site Demolition Activities and indicate the following:

.1 Detailed sequence of selective site demolition and removal work, with starting and ending dates for each activity

.2 Coordination for shutoff, capping, and continuation of utility services

.3 Locations of temporary partitions and means of egress

.3 Construction Waste Management Plan (CWM Plan): Submit a plan of demolition area indicating extent of temporary facilities and supports, methods of removal and demolition prepared by a professional Engineer in accordance with requirements of Authority Having Jurisdiction, and as follows:

.4 Proposed Dust Control, Noise Control Measures: Submit statement or drawing that indicates measures proposed for use, proposed locations, and proposed time frame for their operation.

.5 Inventory: Submit a list of items that have been removed and salvaged after selective site demolition is complete

.1 Pre demolition photographs: Submit photographs indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective site demolition operations.

.6 Provide certificates from disposal facilities to Departmental Representative.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial/Territorial regulations.

.2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.

1.8 SITE CONDITIONS

.1 Perform work in accordance with Section 01 35 43 – Environmental Procedures.

.2 Environmental protection:

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

.2 Fires and burning of waste or materials is not permitted on site.

.3 Burying of rubbish waste materials is not permitted.

.4 Disposal of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers, is not permitted.

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

.3 Pumping of water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties, is not permitted.

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

.5 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.6 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

.7 The Departmental Representative assumes no responsibility for Selective Site elements being demolished:

.1 Conditions existing at time of inspection for bidding purpose shall be maintained by Owner as far as practical.

.2 Before selective site demolition, remove, protect and store salvaged items as directed by the Departmental Representative

.1 Salvage items as identified by the Departmental Representative.

.2 Deliver to the Departmental Representative as directed.

1.9 EXISTING CONDITIONS

.1 Hazardous Materials: It is not expected that hazardous materials shall be encountered in the Work.

.2 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Departmental Representative. Hazardous materials shall be removed by Owner under a separate contract or as a change to the Work.

.3 If material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify the Departmental Representative immediately. Proceed only after receipt of written instructions have been received from the Departmental Representative.

.4 Site elements that shall be demolished are based on their condition on date that tender is accepted.

Part 2 Products

2.1 Not used.

Part 3 Execution

3.1 EXAMINATION

.1 Survey existing conditions and correlate with requirements indicated to determine extent of selective site demolition required.

.2 The Departmental Representative does not guarantee that existing conditions are the same as those indicated in Project Record Documents.

.3 Inventory and record the condition of items being removed and salvaged.

.4 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to the Departmental Representative

.5 Engage a professional Engineer to perform an engineering survey of conditions of adjacent buildings to determine whether removing any site element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective site demolition operations.

.6 Verify that hazardous materials have been remediated before proceeding with site demolition operations.

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

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

.2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

.2 Protection of in-place conditions:

.1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, properties and parts of existing building to remain.

.1 Provide bracing, shoring and underpinning as required.

.2 Repair damage caused by demolition as directed by the Departmental Representative.

.2 Support affected site elements and, if safety of site element being demolished adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify the Departmental Representative.

.3 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.

3.3 REMOVAL AND DEMOLITION OPERATIONS

.1 Identify designated utilities within demolition areas.

.2 Remove items as indicated on the drawings.

.3 Disruption of items designated to remain in place is not permitted.

.4 When removing existing traffic sign or information sign, remove existing concrete foundation if there is any.

.5 Removal of pavements:

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

.2 Protect adjacent joints and load transfer devices.

.6 Stockpile topsoil for final grading and landscaping per Section 31 14 13 Soil Stripping and Stockpiling:

.1 Provide erosion control and seeding if not immediately used.

.7 Salvage:

.1 Dismantle items containing materials for salvage and reuse, and stockpile or store at locations approved by the Departmental Representative.

.8 Disposal of Material:

.1 Dispose of materials not designated for salvage or reuse on site at authorized facilities approved in Waste Reduction Workplan or as instructed by the Departmental Representative

3.4 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 REMOVAL FROM SITE

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

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

3.6 RESTORATION

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

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

3.7 CLEANING

.1 Progress Cleaning:

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

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

.3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 19- Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes description for cleaning and testing of new precast septic holding tank, including repairing leaks and re-testing, as required.

1.2 RELATED REQUIREMENTS

.1 Section 03 41 00 – Precast Structural Concrete

1.3 REFERENCE STANDARDS

.1 ACI 350.1M, “Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures”.

Part 2 Products

2.1 WATER

.1 Potable water testing fill(s) to be provided at Contractor’s expense.

Part 3 Execution

3.1 CLEAN-UP AND INSPECTION

.1 Remove all construction debris, forms, lumber, water and other materials from tank interior.

.2 Sweep and wash all interior concrete surfaces with pressurized water.

.3 The Contractor shall inspect all interior surfaces of the tank, in particular the floor slab and walls, for cracks, honey combing, surface disintegration, opening of joints or other abnormalities. Any or all of such abnormalities shall be suitably repaired and sealed, prior to hydraulic testing.

3.2 REPAIR

.1 Repair as directed by precast supplier.

3.3 TESTING

.1 The leakage test shall be conducted in accordance with ACI 350.1M, specifically Section 2 – Hydrostatic Tightness Test for Open or Covered Containment Structures. The Contractor shall have a copy of this standard on site at the time of testing.

.2 The concrete tank shall not be backfilled until the leakage test has been successfully completed, for both Part 1 Qualitative Criteria and Part 2 Quantitative Criteria. The acceptance criterion for Part 2 is 0.050% of volume per day.

.3 The tank cell shall be filled with clean, potable water to the maximum operating level and maintained for at least three (3) days prior to starting Part 2 Quantitative Criteria of the leakage test.

.4 The exterior surfaces of the reservoir cell shall be observed throughout the day during each day of the initial three (3) day period. If any water is observed on the exterior surfaces where moisture can be picked up with a dry hand, the tank cell shall be considered to have failed Part 1 of the leakage test.

.5 All defects causing failure of Part 1 of the leakage test shall be repaired before acceptance of the tank cell.

.6 Part 2 of the leakage test shall not be scheduled for a period when the forecast is for a difference of more than 19°C between the ambient temperature readings at the times of the initial and final level measurements of the water surface. The test shall also not be scheduled when the weather forecast indicates the water surface could freeze before the test is completed.

.7 The test period for Part 2 of the leakage test shall be 4 days (96 hours).

.8 Measurements of the water surface elevation shall be made every 24 hours. All measurements will be logged and photographic, to be submitted to the Department Representative at the end of every week.

.9 The water temperature shall be recorded at a depth of 450mm below the water surface at the start and end of Part 2 of the leakage test. Volume corrections for temperature differences shall be included in Part 2 of the test.

3.4 DISPOSAL

.1 All water used for testing shall be disposed of by the Contractor in a method acceptable to the Department Representative. Any pumping equipment must be furnished by the Contractor and equipment supplied under this contract by the Department Representative may not be used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-O86-14, Engineering Design in Wood.

.3 CSA O121-08(R2013), Douglas Fir Plywood.

.4 CSA O151-09(2014), Canadian Softwood Plywood.

.5 CSA O153-13, Poplar Plywood.

.6 CAN/CSA-O325.0-16, Construction Sheathing.

.7 CSA O437 Series-93(R2011), Standards for OSB and Waferboard.

.8 CSA S269.1-16, Falsework and Formwork.

.9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork.

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in formwork liners and coatings and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

1.3 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Retain a professional engineer registered or licensed in Alberta, Canada, with experience in formwork and falsework design of comparable complexity and scope, to perform following services as part of Work of this Section:

.1 Design of formwork and falsework:

.2 Review, stamp, and sign fabrication and erection Shop Drawings, design calculations and amendments.

.3 Conduct on-site inspections and prepare and submit inspection reports verifying this part of Work is in accordance with Contract Documents and reviewed Shop Drawings. Perform inspections a minimum of once per month.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect formwork from damages.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.

.2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.

.3 Rigid insulation board: to CAN/ULC-S701.

.2 Form release agent: Proprietary, non-volatile material not to stain concrete or impair subsequent application of finishes or coatings to surface of concrete, derived from agricultural sources, non-petroleum containing, non-toxic, biodegradable.

.3 Falsework materials: to CSA-S269.1.

.4 Sealant: to Section 07 92 00 - Joint Sealants.

Part 3 Execution

3.1 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 2 days for walls and sides of beams.

.2 2 days for columns.

.3 14 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework.

.4 2 days for footings and abutments.

.2 Remove formwork when concrete has reached 70 % of its 28 day design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000 mm apart.

.5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.2 ASTM International (ASTM)

.1 ASTM A 143/A 143M-07(2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.2 ASTM A 1064/A 1064M-16b, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.3 CSA Group (CSA)

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-14, Design of Concrete Structures.

.3 CSA-G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-13(R2014), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 When Chromate solution used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by Consultant prior to its use.

.3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Alberta.

.1 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.

.2 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 Consultant, with identifying code marks to permit correct placement without reference to structural drawings.

.5 Indicate sizes, spacings and locations of chairs, spacers and hangers.

.3 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

.1 Provide type C tension lap splices where indicated unless otherwise indicated.

.4 Indicate position and size of openings in slabs and walls. Coordinate with trades requiring openings.

.4 Quality Assurance Submittals:

.1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.

.2 Mill Test Report: upon request, submit to Consultant certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

.3 Upon request submit in writing to Consultant proposed source of reinforcement material.

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 dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Consultant.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM 1064/A 1064M.

.5 Deformed steel wire for concrete reinforcement: to ASTM 1064/A 1064M.

.6 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.7 Tie wire: 1.5 mm diameter annealed wire.

.8 Mechanical splices: subject to approval of Consultant.

.9 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2.

.2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental 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 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

Part 3 Execution

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A 143/A 143M.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Consultant.

.2 When field bending authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Cutting or puncturing vapour retarder is not permitted; repair damage and reseal vapour retarder before placing concrete.

.2 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.3 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 Apply thick even film of mineral lubricating grease when paint is dry.

.4 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.5 Maintain cover to reinforcement during concrete pour.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C 260/C 260M-10a (2016), Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C 309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C 494/C 494M-16, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C 881/C 881M-15, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

.5 ASTM C 1017/C 1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.6 ASTM D 1751-04(2013) e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA Group

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283-06-R2016, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-13, Cementitious Materials Compendium.

1.2 ABBREVIATIONS AND ACRONYMS

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement types:

.1 GU - General use cement.

.2 HS and HSb - Sulphate-resistant cement.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

.3 Site Quality Control Submittals:

.1 Provide testing results for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters found.

.2 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.3 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete delivered to site of Work and discharged after batching.

1.4 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture meet specified requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Modifying maximum time limit without receipt of prior written agreement from Consultant and concrete producer as described in CSA A23.1/A23.2. is prohibited.

.2 Deviations submitted for review by Departmental Representative.

.3 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

1.6 SITE CONDITIONS

.1 Placing concrete during rain or weather events that could damage concrete is prohibited.

.2 Protect newly placed concrete from rain or weather events in accordance with CSA

A23.1/A23.2.

.3 Cold weather protection:

.1 Maintain protection equipment, in readiness on Site.

.2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.

.3 Placing concrete upon or against surface at temperature below 5°C is prohibited.

.4 Hot weather protection:

.1 Protect concrete from direct sunlight when ambient temperature above 27°C.

.2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.

.5 Protect from drying.

Part 2 Products

2.1 PERFORMANCE CRITERIA

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

2.2 MATERIALS

.1 Portland Cement: Normal Portland Cement in accordance with CSA A3000, Type GU; Sulphate Resisting Portland Cement in accordance with CSA A3000, Type HS.

.2 Water: to CSA A23.1.

.3 Aggregates: to CSA A23.1/A23.2.

.4 Admixtures:

.1 Air entraining admixture: to ASTM C 260.

.2 Chemical admixture: to ASTM C 1017. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

2.3 MIXES

.1 Ensure materials used in concrete mix have been submitted for testing and meet requirements of CSA A23.1.

.2 Co-ordinate construction methods to suit Departmental Representative concrete mix proportions and parameters.

.3 Identify and report immediately to Departmental Representative when concrete mix design and parameters pose anticipated problems or deficiencies related to construction.

Part 3 Execution

3.1 PREPARATION

.1 Obtain Departmental Representative 's written approval before placing concrete.

.1 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 facilitate placing with minimum of re-handling, and without damage to existing structure or Work.

.5 Disturbing reinforcement and inserts during concrete placement is prohibited.

.6 Prior to placing of concrete obtain Departmental Representative 's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

.9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, workability, air content, temperature and test samples taken.

3.2 INSTALLATION / APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Sleeves and inserts:

.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.

.2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.3 Sleeves and openings greater than 100 x 100 mm not indicated reviewed by Departmental Representative.

.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.

.5 Confirm locations and sizes of sleeves and openings shown on drawings.

.6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts:

.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.

.2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.

.1 Formed holes: 100 mm minimum diameter.

.2 Drilled holes: 25 mm minimum diameter larger than bolts used to manufacturers' recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.4 Set bolts and fill holes with shrinkage compensating grout epoxy grout.

.5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.4 Drainage holes and weep holes:

.1 Install weep hole tubes and drains as indicated.

3.3 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

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

.1 Ensure testing laboratory certified to CSA A283.

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

3.4 CLEANING

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

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM C 309-11, Liquid Membrane-Forming Compounds for Curing Concrete.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.3 CSA Group (CSA)

.1 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction//Methods of Test for Concrete.

.4 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-A2016, Architectural Coatings. CSA Group (CSA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content in g/L.

.3 Include application instructions for concrete floor treatments.

1.3 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Minimum 4weeks prior to starting concrete finishing work, provide proposed quality control procedures for review by Consultant on following items:

.1 Hardening.

.2 Sealing.

.3 Curing.

.4 Finishes.

1.4 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, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.5 SITE CONDITIONS

.1 Temporary lighting: Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.

.2 Electrical power: Provide sufficient electrical power to operate equipment normally used during construction

.3 Work area: Make work area water tight protected against rain and detrimental weather conditions.

.4 Temperature: Maintain minimum 10 degrees C ambient temperature for 7 days before installation and minimum 48 hours after completion of work and maintain relative humidity maximum 40% during same period.

.5 Moisture: Ensure concrete substrate within moisture limits prescribed by flooring manufacturer.

.6 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

Part 2 Products

2.1

2.2 PERFORMANCE REQUIREMENTS

.1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Submit written declaration components used compatible and not adversely affect finished flooring products and their installation adhesives.

Part 3 Execution

3.1 EXAMINATION

.1 Verify site conditions surfaces ready to receive work and elevations recommended by manufacturer's written instructions.

3.2 PREPARATION OF EXISTING SLAB

.1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges unless otherwise indicated.

.2 Saw cut control joints to CAN/CSA-A23.1, 24 hours maximum after placing of concrete.

.3 Use mechanical stripping to remove chlorinated rubber or existing surface coatings.

.4 Use protective clothing, eye protection, respiratory equipment during stripping of chlorinated rubber or existing surface coatings.

3.3 CONCRETE STAINING

.1 Coordinate with Section 03 30 00 for wet curing. Liquid curing compounds not permitted under staining.

.2 Cure concrete for minimum 60 days.

.3 Clean and prepare concrete in accordance with manufacturers written instructions.

.4 Apply 2 coats of chemical stain materials in accordance with manufacturers written instructions; obtain Departmental Representative's acceptance after application of both first and second coats.

.5 Apply recommended cure/seal materials in accordance with manufacturer's written instructions, in number of coats to achieve flat floor luster.

3.4 APPLICATION

.1 Apply concrete finishing floor hardener in accordance with manufacturer's written instructions.

.2 After floor treatment dry, seal control joints and joints at junction with vertical surfaces with sealant.

.3 Apply floor treatment in accordance with Sealer manufacturer's written instructions.

.4 Clean over spray. Clean sealant from adjacent surfaces.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.6 PROTECTION

.1 Protect finished installation in accordance with manufacturer's instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 01 30.52 – Hydraulic Testing and Cleaning of Precast Septic Tank.

.2 Section 03 30 00 – Cast in Place Concrete

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM).

.2 ASTM A123/A123M, Standard Specification for Zinc (Hot Dipped Galvanized) Coatings Iron and Steel Products.

.3 ASTM A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.1 ASTM C 260-10a Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM D 412-15a, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

.3 ASTM D 2240-13, Standard Test Method for Rubber Property - Durometer Hardness.

.4 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-09 (R2014) Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-A23.3- (R2014), Design of Concrete Structures.

.3 CSA-A23.4- (R2014), Precast Concrete - Materials and Construction.

.4 CAN/CSA-A3000- 13Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.

.5 CAN/CSA-G30.18- 09 (R2014), Billet-Steel Bars for Concrete Reinforcement.

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

.7 CSA-W47.1- 09 (R2014), Certification of Companies for Fusion Welding for Steel.

.8 CAN/CSA W48-14 Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.9 CSA-W59-13, Welded Steel Construction (Metal Arc Welding) (Metric version).

.10 CSA-W186 - M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.11 The Master Painters Institute (MPI) - Architectural Painting Specification Manual (ASM) - [February 2004]

.1 MPI # 18, Organic Zinc Rich Primer.

.2 MPI # 23, Oil Alkyd Primer.

.12 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 DESIGN REQUIREMENTS

.1 Precast elements include:

.1 Exterior Architectural Walls

.2 Interior Architectural Wall

.3 Structural Slab

.4 Underground Septic Tank

.2 Design precast elements to CSA-A23.3 and CSA-A23.4 to carry handling stresses.

.3 Design precast elements to carry loads as indicated on the Drawings, and in accordance with NBCC.

.4 Design connections/attachments of precast elements to load/forces specified on drawings.

.5 Provide detailed calculations and design drawings for typical precast elements and connections as described in Section 1.4.

.6 Underground septic tank is to carry human waste – design to include appropriate concrete cover.

.7 Design underground septic tank to suit a variety of soil types and conditions as described in the Geotechnical Report.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit shop drawings in accordance with CSA-A23.3 and CSA-A23.4 and include following items:

.1 Design calculations for items designed by manufacturer.

.2 Details of prestressed and non-prestressed members, reinforcement and their connections.

.3 Camber.

.4 Finishing schedules.

.5 Methods of handling and erection.

.6 Openings, sleeves, inserts and related reinforcement.

.3 Submit copy of detailed calculations and design drawings for typical precast elements and connections for review by Departmental Representative prior to manufacture.

.4 Shop Drawings: submit drawings stamped and signed by qualified Professional Engineer registered or licensed in Province of Alberta, Canada. Shop drawings to show design loads and support reactions

.5 Submit samples in accordance with Section 01 33 00 – Submittal Procedures and provide sample and sample number of each finish to be used on project to Departmental Representative as requested.

1.5 QUALIFICATIONS

.1 Fabricate and erect precast concrete elements by manufacturing plant certified according to CSA-A23.4.

.2 Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting tender and to specifically verify as part of tender that plant is currently certified in appropriate category lies: Structural and Architectural.

.3 Only precast elements fabricated in such certified plants to be acceptable to Departmental Representative and plant certification to be maintained for duration of fabrication, erection until warranty expires.

.4 Welding companies certified to CSA-W47.1.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle in accordance with Section 01 61 00 Common Product Requirements.

.2 Deliver, handle and store precast/prestressed units according to manufacturer's instructions.

.3 Protect unit corners from contacting earth to prevent from staining.

.4 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waster Management and Disposal.

1.7 WARRANTY

.1 Contractor warrants that precast elements shall not spall or show visible evidence of cracking, except for normal hairline shrinkage cracks for the one (1) year warranty period.

Part 2 Products

2.1 MATERIALS

.1 Portland Cement to CAN/CSA-A3001, Type HS.

.2 Supplementary cementing materials: Type F CI CH fly ash replacement to CSA A231.

.3 Water: to CSA-A23.1/A23.2.

.4 Aggregates: to CSA A231. Coarse aggregates to be normal density. Ironstone content shall not exceed 1.0% for Coarse aggregate and 1.5% for Fine aggregate. Coal and lignite content shall not exceed 0.1% for Coarse aggregate and 0.5% for Fine aggregate.

.5 Reinforcing steel: to CAN/CSA-G30.18.

.6 Prestressing steel tendons and bars: to CAN/CSA-S6.

.7 Welded wire fabric: to ASTM A 185/A 185M.

.8 Hardware and miscellaneous materials: to CSA-A23.1/A23.2.

.9 Forms: to CSA-A23.4.

.10 Anchors and supports: to CAN/CSA-G40.21 Type 300 W galvanized after fabrication.

.11 Welding materials: to CSA W48.

.12 Welding electrodes: to CSA W48 certified by Canadian Welding Bureau.

.13 Galvanizing: hot dipped galvanizing to ASTM A123 / A123M.

.14 Zinc-rich primer: to CAN/CGSB-1.181.

.15 Post-tensioning ducts: to CSA-A23.1/A23.2.

.16 Air entrainment admixtures: to ASTM C260.

.17 Chemical admixtures: to ASTM C494/C494M.

.18 Shims: plastic.

.19 Weep hole tubes: purpose made galvanized steel.

2.2 MANUFACTURED UNITS

.1 Manufacture units in accordance with CSA-A23.4.

.2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit not is exposed.

.3 Provide hardware suitable for handling elements.

.4 Galvanize anchors and steel embedments after fabrication and touch up with zinc-rich primer after welding.

2.3 FINISHES

.1 Precast wall panels to have architectural finish on exterior faces with cedar panel style and stone veneer as shown on the Drawings and in the Specifications.

.2 Exterior of precast wall panels to be painted with concrete primer and two coats of dark brown.

.3 Interior of precast wall panels to be painted with concrete primer and two coats of off white.

.4 Exposed surface of precast slab to have light broom finish or alternative non-slip finish approved by the Departmental Representative.

2.4 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative with certified copies of quality control tests related to this project as specified in CSA-A23.4.

Part 3 Execution

3.1 ERECTION

.1 Do precast concrete work in accordance with CSA-A23.4, CSA-A23.3 and CAN/CSA-S6.

.2 Do welding in accordance with CSA-W59, for welding to steel structures and CSA-W186, for welding of reinforcement.

.3 Non-cumulative erection tolerances in accordance with CSA-A23-4.

.4 Set elevations and alignment between units to within allowable tolerances before connecting units.

.5 Grout underside of unit bearing plates with shrinkage compensating grout.

.6 Fasten precast units in place as indicated on reviewed and approved shop drawings.

.7 Uniformly tighten bolted connections with torque indicated.

.8 Do not weld or secure bearing plates at sliding joints.

.9 Install precast concrete closures between stems of flanged units where indicated.

.10 Use grout to align elevations of surfaces at joints. Slope grout not more than 1:12.

.11 Clean field welds with wire brush and touch-up galvanized finish with zinc-rich primer.

3.2 CLEANING

.1 Use cleaning methods as reviewed by Departmental Representative before cleaning soiled precast concrete surfaces.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 43 23 Quarried Stone Veneer Cladding.

1.2 REFERENCE STANDARDS

.1 CSA Group

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.

.3 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.2 International Masonry Industry All-Weather Council (IMIAC)

.1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

.3 South Coast Air Quality Management District (SCAQMD)

.1 SCAQMD Rule 1168-[05], Adhesive and Sealant Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS. Indicate VOC's mortar, grout, parging, colour additives and admixtures. Expressed as grams per litre (g/L).

1.4 QUALITY ASSURANCE

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

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect masonry mortar and grout packages from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:

.1 Minimum 10 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Weather Requirements: CAN/CSA-A371

Part 2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Cement:

.1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement (Type 10)

.3 Aggregate: supplied by one supplier.

.1 Fine Aggregate: to CAN/CSA-A179.

.2 Course Aggregate: to CAN/CSA-A179.

.4 Water: clean and potable.

.5 Lime:

.1 Hydrated Lime: to CAN/CSA-A179, Type N

.6 Anti-freeze compounds: do not use any anti-freeze liquid, salts or other substances to lower the freezing point of the mortar.

.7 Pigments: Color black. Mixed with mortar to match color of adjacent stone work. Contractor to record mix proportion for future reference. Not to exceed 10% of the weight of the Portland cement mix.

2.2 MORTAR MIXES

.1 Mortar for exterior masonry above grade:

.1 Type N based on proportion specifications, producing not less than 10Mpa at 28 days.

2.3 MORTAR MIXING

.1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to within 1% accuracy.

.2 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use.

.3 Maintain sand uniformly damp immediately before mixing process.

.4 Add mortar colour in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.

.5 Using anti-freeze compounds including calcium chloride or chloride-based compounds is prohibited.

.6 Adding air entraining admixture to mortar mix is prohibited.

.7 Use a batch type mixer in accordance with CAN/CSA-A179.

.8 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that shall retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.9 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.

.10 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

2.4 GROUT MIXES

.1 Grout: Non-shrunk, minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA-A179.

2.5 GROUT MIXING

.1 Mix batched and delivered grout in accordance with CSA A23.1/A23.2 transit mixed.

.2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA-A179 fine grout.

.3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.

.4 Using calcium chloride or chloride based admixtures is prohibited.

2.6 MIX TESTS

.1 Testing Mortar Mix:

.1 Test mortar to in accordance with CAN/CSA-A179. Test prior to construction for:

.1 Compressive strength.

.2 Consistency.

.3 Mortar aggregate ratio.

.4 Sand/cement ratio.

.5 Water content and water/cement ratio.

.6 Air content.

.7 Splitting tensile strength.

.2 Testing Grout Mix:

.1 Test grout in accordance with CAN/CSA-A179. Test prior to construction for:

.1 Compressive strength.

.2 Sand/cement ratio.

.3 Water content and water/cement ratio.

.4 Slump.

.3 Submit samples to laboratory of mix and water proposed to be used on the project for testing to ensure that the mortar shall not produce efflorescence. Do not begin masonry work until the proposed mortar mix tests are approved by the Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

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

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

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

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

3.2 PREPARATION

.1 Apply bonding agent to existing concrete surfaces.

3.3 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise.

3.4 MIXING

.1 Pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes. Mixing by hand pre-approved by the Departmental Representative.

.2 Clean mixing boards and mechanical mixing machine between batches.

.3 Mortar: weaker than units it is binding.

.4 Contractor to appoint one individual to mix mortar, for duration of project. In event that this individual is changed, mortar mixing must cease until new individual is trained, and mortar mix is tested.

.5 Thoroughly mix ingredients in quantities needed for immediate use.

.6 Adjust consistency of mortar by adding maximum amount of water consistent with workability to provide maximum tensile bond strength. Air content in mortar to be kept to minimum.

.7 Mix mortar to an initial flow of 100 to 115, having a flow after suction of not less than 70%.

.8 For masonry work which has an upward facing horizontal exterior exposure, air entrain mortar to provide 4-6% air content.

.9 Use all mortar within 2 hours of mixing temperatures over 27°C, under 10°C – 2.5 hours.

.10 Mortar may be retempered within 2 hours of mixing to replace water lost by evaporation. Do not retemper mortar after 2 hours of mixing.

.11 Remove all excess mortar.

3.5 MORTAR PLACEMENT

.1 Install to manufacturer's instructions.

.2 Install mortar to requirements of CAN/CSA-A179.

.3 Install mortar and grout to requirements of Section 04 43 23 Quarried Stone Veneer Cladding.

.4 Remove excess mortar from grout spaces.

3.6 GROUT PLACEMENT

.1 Install grout in accordance with manufacturer's instructions.

.2 Install grout in accordance with CAN/CSA-A179.

.3 Work grout into masonry cores and cavities to eliminate voids.

.4 Installing grout in lifts greater than 400 mm, without consolidating grout by rodding is prohibited.

.5 Displacing reinforcement while placing grout is prohibited.

3.7 FIELD QUALITY CONTROL

.1 Site Tests, Inspection:

.1 Test and evaluate mortar prior to construction in accordance with CAN/CSA-A179.

.2 Test and evaluate grout prior to construction to CAN/CSA-A179; test in conjunction with masonry unit sections specified.

3.8 CLEANING

.1 Progress Cleaning:

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

.2 Remove droppings and splashings using clean sponge and water.

.3 Clean masonry with low pressure clean water and soft natural bristle brush.

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

3.9 PROTECTION

.1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 13 Masonry Mortar and Grout

1.2 REFERENCE STANDARDS

.1 ASTM International

- .1 ASTM C144-11, Standard Specification for Aggregate for Masonry Mortar.
- .2 ASTM C207-06 (2011), Standard Specification for Hydrated Lime for Masonry Purposes.
- .3 ASTM C568/C568M, Standard Specification for Limestone Dimension Stone.
- .4 ASTM C616/C616M, Standard Specification for Quartz-Based Dimension Stone.

.2 CSA Group

- .1 CAN/CSA-A370-04(R2009), Connectors for Masonry.
- .2 CAN/CSA-A371-04(R2009), Masonry Construction for Buildings.
- .3 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 South Coast Air Quality Management District (SCAQMD)

- .1 SCAQMD Rule 1168-05, Adhesive and Sealant Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for quarried stone veneer cladding and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Alberta, Canada.
- .2 Indicate sizes and sections of stone veneer, arrangements of joints and bonding, anchoring, dowelling and cramping.
- .3 Each section of stone indicated on shop drawings must bear corresponding number marked on its back or bed.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports, including sand gradation tests in accordance with CAN/CSA-A179, showing compliance with specified performance characteristics and physical properties.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Store materials in dry location approved by the Departmental Representative and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect quarried stone veneer cladding from nicks, scratches, and blemishes. Protect stockpiles at all time from weather, dirt and damage.

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions:

.1 Do not install at temperatures below 12 degrees C or above 38 degrees C.

.2 Maintain temperatures at or above 12 degrees C until cementitious materials have fully cured.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.

.2 Field Measurements:

.1 Make site measurements necessary to ensure proper fit of members.

Part 2 Products

2.1 MATERIALS

.1 Stone Veneer:

.1 Chestnut Random Thin Veneer Masonry as supplied by Thunderstone Quarries, Kamenka Quarry Ltd. or approved equivalent.

.2 Stone to have a split face finish, with tightly spaced graining, that can be shaped without excessive splitting or fragmentation.

.3 Irregular pieces, sizing to vary with no pieces smaller than 200 mm in length.

.2 All metal supports, connectors and anchors to conform to CSA A370 and A371, double hot dip galvanized except as specified.

.3 Threaded rods: Hilti HY-150, or approved equivalent.

.4 Masonry Ties: Corrugated strip-tie to confirm to CSA-A370-94. Manufactured by Fero Corp or approved equivalent.

.5 Steel Angle: Steel Angle ledger 90x90x10 double dip galvanized

.6 Stainless Steel pints: 12.5mm diameter x 200mm long stainless steep pints to ASTM A666, type 304.

.7 Veneer wall ties to concrete backup:

.1 Anchors, Dowels, Ties (steel to ASTM A36) sizes and configurations required for support of stone applicable to superimposed loads and seismic loads.

.2 Masonry ties to be double hot dip galvanized spaced at 400 mm o.c unless otherwise indicated on drawings.

.8 Perforated and Non-perforated Rigid Drain Pipe: 100mm dia. Polyvinyl Chloride (PVC) conforming to CSA B182.1M (if applicable).

2.2 MORTAR AND ADHESIVE MATERIALS

.1 As specified in Section 04 05 13 Masonry Mortar and Grout.

2.3 GROUT

.1 As specified in Section 04 05 13 Masonry Mortar and Grout.

2.4 FABRICATION AND MANUFACTURE

.1 Split stone accurately to sizes, shapes and details indicated on the reviewed shop drawings.

.2 Back check stone as required to structural work indicated. Cut holes as required for anchorages, cramps and dowels, etc. Cut and drill stone as required for installation in built-in work.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that work of other sections previously installed under other Sections or Contracts are acceptable for quarried stone veneer cladding installation in accordance with manufacturer's written instructions.

.1 Inform the Departmental Representative of unacceptable conditions, defects, discrepancies in accuracy or suitability in the location, bearing and retaining of structural members immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

.2 Back-check stone contacting structural members as indicated. Allow minimum of 25 mm clearance between back of stone and steel and concrete structural members. Shape beds of stone resting on structural work to fit supports.

.3 Cut stones for anchors, clamps, dowels and support systems. Do not cut holes in exposed surfaces.

3.3 INSTALLATION

.1 Construction in accordance with CAN/CSA-A371.

3.4 STEEL ANGLES

.1 Install angle required for stone support.

.2 Fasten angle to wall with 3-16mm dia. X 200mm L threaded rod, embdedded 150mm, unless otherwise specified on the drawings.

3.5 STONE VENEER ANHORAGE

.1 Install ties in accordance with CSA-S304 and CSA-A370-94.

.2 Install at maximum 400mm O.C. vertically and at every vertical joint horizontally.

.3 Use only rotary drills, without percussion.

.4 Place additional ties so that there is a tie not more than 100mm from edge of wall.

3.6 VENEER INSTALLATION

.1 Clean stone exposed surfaces by washing with stiff fibre brush and water.

.2 Drench dry stones with clean water just before setting.

.3 Make joints 12 mm thick.

.4 Set stones plumb, true, level in full bed of mortar with vertical joints slushed full except where otherwise specified. Completely fill anchor, dowel and lifting holes. Keep edges and faces aligned to respect indicated tolerances.

.5 Coordinate location of mortar joints with locations of masonry ties. Ensure that the connectors are bedded solidly in the mortar joints and not in contact with stone surfaces.

.6 Remove mortar droppings and splashings from face of stone before mortar is set. Sponge stone free of mortar along joints as work progresses.

.7 Place plastic or lead setting pads or soft-wood wedges under stones to maintain joint thickness. Set heavy stones and projecting courses after mortar in courses below has hardened sufficiently to support weight.

.8 Prop and anchor projecting stones until wall above is set.

.9 Use soaked softwood wedges to support stone in proper alignment until mortar has set. Remove wedges when dry and without breaking them off, fill voids with pointing mortar.

.10 Tool joints after initial set has occurred.

.11 Rake out joints to 25 mm depth and make ready for pointing with pointing mortar. Sponge stone face along joints and remove droppings and splashed mortar immediately.

.12 Cap with a single cap stone that span the full width of the wall, including overhang. Machine split capstone to lengths as indicated on the drawings.

.13 Slope capstone with a minimum 1% slope, unless otherwise indicated.

.14 Set capstone with unfilled vertical joints.

.15 Brush raked out joints clean, remove wedges, and fill joints with pointing mortar. Color of mortar to match adjacent stone. Pack mortar and work it into joints.

.16 Pointing: remove dirt and loose mortar from joints by using pressure air stream.

- .1 Wet joints for mortar pointing. Dry joints for sealant pointing.
- .2 Point joints with pointing mortar in 2 stages. Rub smooth with plastic tool to slightly concave joint.

3.7 TOLERANCES

.1 To CAN/CSA-A371

3.8 CLEANING

.1 Progress Cleaning:

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

.2 At end of each working day, brush off loose mortar from stone face.

.3 At completion, wash stonework with stiff-fibre brushes and clean water.

3.9 PROTECTION

.1 Protect vertical corners, projecting areas, and the like, with protection boards. Cover walls at night and during rain.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 53 Miscellaneous Rough Carpentry

1.2 REFERENCE STANDARDS

.1 ASTM International

- .1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A269M-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 CSA Group

- .1 CSA G40.20-13 /G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-[M92 (R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding) Metric.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

- .1 Submit drawings must be reviewed and approved by professional Engineer registered or licensed in Alberta, Canada.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- .3 Include erection drawings, elevations and details where applicable.
- .4 Indicate welded connections using standard welding symbols. Clearly indicate net weld lengths.

1.4 QUALITY ASSURANCE

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

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 QUALIFICATIONS

.1 Fabricator and erector must be certified and approved by the Canadian Welding Bureau in conformance with CSA W47.1-92 Division 1 or 2.2. Perform welding using currently licensed welders only. Submit evidence of certification to Bow Valley Safety Inspections prior to commencement of work.

.2 Welding procedures, welders and welding operations shall be qualified in accordance with Canadian Welding Bureau Standards.

.3 All welders employed to weld load carrying structures in the field must possess a valid "S" classification Class "O" certificate issued by the Canadian Welding Bureau.

1.6 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Store materials in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

1.7 FIELD QUALITY CONTROL

.1 Verify all dimensions on site prior to fabrication.

Part 2 Products

2.1 MATERIALS

.1 Supply new materials, free from defects impairing strength, durability or appearance, of best commercial quality for purposes specified.

.2 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.

.3 Steel pipe: to ASTM A53/A53M, grade b, black galvanized finish, size as indicated on the drawings.

.4 Welding materials: to CSA W59.

.5 Welding electrodes: to CSA W48 Series.

.6 Bolts and anchor bolts: to ASTM A307.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Provide flush countersunk screws or bolts to all exposed mechanical fastenings, located consistent with design.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.

.5 Thoroughly clean all surfaces of rust, scale, grease and foreign matter prior to prime painting or galvanizing.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^{2}to CAN/CSA-G164.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

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

.2 Proceed with installation only after unacceptable conditions remedied [and after receipt of written approval to proceed from the Departmental Representative.

3.2 ERECTION - GENERAL

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to the Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:

.1 Primer: maximum VOC limit 250 g/L to GS-11.

.7 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

.1 Primer: maximum VOC limit 250 g/L to GS-11.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Heavy Timber Section 06 13 23

.2 Misc. Rough Carpentry Section 06 10 53

1.2 REFERENCES

.1 American National Standards Institute/National Particleboard Association (ANSI/NPA)

.1 ANSI/NPA A208.1-2009, Particleboard.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A563M-07(R2013), Standard Specification for Carbon and Alloy Steel Nuts

.3 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.

.4 ASTM D5933-96(2001), Standard Specification for 25⁄8-in. and 4-in. Diameter Metal Shear Plates for Use in Wood Constructions

.5 ASTM F1167-15, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.6 ASTM F568M, Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

.3 American Wood Preservers' Association (AWPA)

.1 AWPA M2-15, Standard for Inspection of Treated Wood Products.

.2 AWPA M4-11, Standard for the Care of Preservative-Treated Wood Products.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3-M87, Hardboard.

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.3 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction and amendment.

.4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.5 Canadian Standards Association (CSA International)

.1 CSA O80 Series-15 and O80S2-05, Wood Preservation.

.2 CSA O86-14, Engineering Design in Wood.

.3 CSA O112.9-10 (2014), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

.4 CSA O121-08 (R2013), Douglas Fir Plywood.

.5 CAN/CSA O122-16, Structural Glued-Laminated Timber.

.6 CSA O141-05 (R2014), Softwood Lumber.

.7 CSA O151-09 (R2014), Canadian Softwood Plywood.

.8 CSA O153-13, Poplar Plywood.

.9 CSA O325-07 (R2012), Construction Sheathing.

.10 CSA O437 Series-93 (R2011), Standards on OSB and Waferboard.

.11 CAN/CSA-Z809-08 (R2013), Sustainable Forest Management.

.6 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber.

.7 American Institute of Timber Construction (AITC)

.1 AITC 108, "Standard for Heavy Timber Construction."

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer’s instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.2 For connectors, include installation instructions.

.3 For products treated with preservative by pressure impregnation, submit following information certified by authorized signing officer of treatment plant:

.1 Information listed in AWPA M2 and revisions specified in CSA O80 Series, Supplementary Requirement to AWPA M2 applicable to specified treatment.

.2 Moisture content after drying following treatment with water- borne preservative.

.3 Acceptable types of paint, stain, and clear finishes that may be used over treated materials to be finished after treatment.

.3 Shop Drawings: Submit drawings showing layout, dimensions of each member, and details of connections.

.4 Material Certificates:

.1 Indicate species and grade selected for each use per National Lumber Grades Authority - Standard Grading Rules for Canadian Lumber.

.5 Certificates of Inspection: Issued by lumber grading agency for exposed timber not marked with grade stamp.

1.4 QUALITY ASSURANCE

.1 Certification: Material certificate required per National Lumber Grades Authority - Standard Grading Rules for Canadian Lumber. Each section to be marked with grade identifying stamp.

.2 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.3 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle in accordance with Section 01 61 00 Common Product Requirements.

.2 Schedule delivery of lumber to avoid extended on-site storage and to avoid delaying the Work.

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

.4 Storage and Handling Requirements:

.1 Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

.2 Store and protect wood from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 DESCRIPTION

.1 Sustainability Characteristics:

.1 Lumber to be CAN/CSA-Z809 or FSC or SFI certified.

.2 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber

.3 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", The Truss Plate Institute of Canada.

.4 Framing and board lumber: Douglas Fir-Larch No.1/No.2 Grade or S.P.F. No.1/No.2 Grade unless noted otherwise.

.5 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:

.1 Board sizes: "Standard" or better grade.

.2 Dimension sizes: "Standard" light framing or better grade.

.3 Post and timbers sizes: "Standard" or better grade.

.6 Plywood, OSB and wood based composite panels: to CSA O325. Thickness as indicated on Drawings.

.7 Douglas fir plywood (DFP): to CSA O121, standard construction.

.8 Canadian softwood plywood (CSP): to CSA O151, standard construction.

.9 Poplar plywood (PP): to CSA O153, standard construction.

.10 All lumber materials in contact with concrete or soil to be pressure treated to CSA O80.

2.2 ACCESSORIES

.1 Nails, spikes and staples: to CSA B111.

.2 Bolts: diameter as indicated on the Drawings or shop drawings, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.4 Joist hangers: minimum 1 mm thick sheet steel, galvanized coating designation unless noted otherwise.

.5 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

.6 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Departmental Representative.

.7 Fastener Finishes:

.1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for exterior work, interior highly humid areas, pressure-preservative treated lumber and where noted on the Drawings.

.2 Black powder coated steel: for exposed connectors as shown on the Drawings.

.8 Wood Preservative: to CSA O80 Series, in accordance with manufacturer's recommendations for surface conditions:

.1 Preservative: VOC limit 350 g/L maximum to SCAQMD Rule 1113.

2.3 FABRICATION

.1 Camber: Fabricate horizontal members and inclined members with a slope of less than 1:1, with natural convex bow (crown) up, to provide camber.

.2 Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.

.3 Predrill for fasteners and assembly of units.

.4 Coat crosscuts with end sealer.

.5 Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent.

Part 3 Execution

3.1 INSTALLATION

.1 General: Erect lumber true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

- .1 Install lumber to comply with Shop Drawings.
- .2 Install horizontal and sloping members with crown edge up and provide not less than 102 mm of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports if not continuous.
- .3 Handle and temporarily support lumber construction to prevent surface damage, compression, and other effects that might interfere with indicated finish.

.2 Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

.3 Fit members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.

- .1 Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
- .2 Coat crosscuts with end sealer.

.4 Install wall sheathing in accordance with manufacturer’s printed instructions and as indicated on the Drawings.

.5 Install roof sheathing in accordance with requirements of the NBCC and as indicated on the Drawings.

.6 Install furring and blocking as required to space-out and support casework, wall and ceiling finishes, facings, fascia, soffit, siding, electrical equipment mounting boards, and other work as required.

.7 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.

- .1 Align and plumb faces of furring and blocking to tolerance of 1:600.

.8 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.9 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using steel fasteners.

.10 Install sleepers as indicated.

.11 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

.12 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.13 Countersink bolts where necessary to provide clearance for other work.

.14 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

.15 Install connectors as indicated.

.1 Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.

Install bolts with orientation as indicated or, if not indicated, as directed by Department Representative.

3.2 ADJUSTING

.1 Repair damaged surfaces and finishes after completing erection. Replace damaged lumber construction if repairs are not approved by Department Representative.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute/National Particleboard Association (ANSI/NPA)

.1 ANSI/NPA A208.1-[2009] Particleboard.

.2 ASTM International

.1 ASTM A123/A123M-[15], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A153/A153M-[09] Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM A307-[14] Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

.4 ASTM A653/A653M-[15], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM D 5055-[13e1], Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

.6 ASTM D 5456-[14b], Standard Specification for Evaluation of Structural Composite Lumber Products.

.7 ASTM F1667-[13] Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3-[M87], Hardboard.

.2 CAN/CGSB-71.26-[M88], Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.4 Canadian Wood Council

.1 Wood Design Manual [2010 (R2014)] Edition

.2 Engineering Guide for Wood Frame Construction [2014]

.5 CSA International

.1 CAN/CSA-A123.2-[03 (R2013)], Asphalt Coated Roofing Sheets.

.2 CSA B111-[1974 (R2003)], Wire Nails, Spikes and Staples.

.3 CSA O86-[14] Engineered Design in Wood

.4 CSA O112.9-[10], Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

.5 CSA O121-[08 (R2013)], Douglas Fir Plywood.

.6 CSA O141-[05 (R2014)], Softwood Lumber.

.7 CSA O151-[09 (R2014)], Canadian Softwood Plywood.

.8 CSA O153-[13], Poplar Plywood.

.9 CSA O325-[07 (R2012)], Construction Sheathing.

.10 CAN/CSA-S406-[92 (R2008)], Construction of Preserved Wood Foundations.

.11 CAN/CSA-Z809-[08], Sustainable Forest Management.

.6 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.

.7 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber [2010].

.8 National Research Council Canada (NRC)

.1 National Building Code of Canada [2015] (NBC).

.9 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)

.1 SCAQMD Rule 1168-[A2005], Adhesives and Sealants Applications.

.10 Sustainable Forestry Initiative (SFI)

.1 SFI-[2015-2019] Standard.

.11 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S706-[09], Standard for Wood Fibre Insulating Boards for Buildings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Include manufacturer’s pre-engineered floor, ceiling and roof joist span charts, and manufacturer’s pre-engineered installation details.

.3 Submit certified test reports for prefabricated structural members from approved independent laboratory indicating compliance with specifications for specified performance characteristics and physical properties.

.4 Submit CCMC Product Evaluation Report for engineered wood products.

.5 Submit manufacturer’s installation instructions.

.2 Shop Drawings:

.1 For structural applications or conditions beyond the scope of the manufacturer’s pre-engineered design information, submit drawings stamped and signed by professional engineer registered or licensed in the Province of Alberta, Canada.

.2 Include on drawings:

.1 Design data in accordance with CAN/CSA-O86 and CWC Engineering Guide for Wood Frame Construction.

.2 Indicate configuration and spacing of joists, hanger and connector types, fasteners, locations and design values; bearing details.

.3 Submit stress diagrams or print out of computer design indicating design loads for members. Indicate allowable load and stress increase.

.4 Indicate arrangement of webs or other members to accommodate ducts and other specialties.

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.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store materials off ground with moisture barrier at both ground level and as a cover forming a well-ventilated enclosure, with drainage to prevent standing water.

.3 Store wood I-beams and I-joists on edge.

.4 Stack, lift, brace, cut and notch engineered lumber products in strict accordance with manufacturer’s instructions and recommendations.

.5 Store and protect from nicks, scratches, and blemishes.

.6 Replace defective or damaged materials with new.

.7 Store separated reusable wood waste convenient to cutting station and work areas.

Part 2 Products

2.1 STRUCTURAL FRAMING

.1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Framing and board lumber: in accordance with ABC

2.2 FURRING AND BLOCKING

.1 Furring, blocking, nailing strips, grounds, rough bucks, fascia backing and sleepers:

.1 Board sizes: "Standard" or better grade.

.2 Dimension sizes: "Standard" light framing or better grade.

.3 Post and timbers sizes: "Standard" or better grade.

.2 Where indicated, provide pressure treated materials for furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers in accordance with Section 06 05 73.

2.3 MATERIALS AND PRODUCTS FOR TREATED WOOD FOUNDATIONS

.1 Lumber materials: to CAN/CSA-S406 and as follows.

.1 Preservative treatment: Alkaline copper quaternary (ACQ) water borne preservative treatment for all wood unless otherwise noted on Drawings.

.2 Fasteners and connectors, moisture barrier, sealant and field applied preservative: to CAN/CSA-S406.

2.4 ACCESSORIES

.1 Subflooring adhesive: to CAN/CGSB-71.26, cartridge loaded.

.2 General purpose adhesive: to CSA O112.9.

.3 Nails, spikes and staples: to ASTM F1667.

.4 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.5 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.6 Joist hangers, connectors and fasteners: in accordance with accepted shop drawings, minimum 1 mm thick sheet steel, galvanized to minimum ZF001 coating designation.

.7 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

.8 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Departmental Representative.

.9 Fastener Finishes:

.1 Galvanizing: to ASTM A653 use galvanized fasteners for exterior work.

.2 Proprietary corrosion resistant fasteners for treated lumber: as recommended by manufacturer for material and service conditions and as specified in Section 06 05 73.

.10 Wood Preservative: Alkaline copper quaternary (ACQ) water borne preservative treatment for all wood unless otherwise noted on Drawings.

.11 Sill Plate Gasket: Closed cell polyethylene foam gasket in width to match sill plate width, 6 mm thick.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 SYSTEMS INTEGRATION

.1 Install air barrier and vapour retarder sheeting around framing members to ensure continuity of protection and to lap and seal to main sheets.

.2 Install insulation in exterior wall framing cavities that shall not be accessible after completion of framing.

.3 Install sill plate gasket in continuous lengths between concrete surfaces and wood framing.

3.3 FRAMING INSTALLATION

.1 Install engineered framing and plant fabricated structural wood components, including all hangers, connectors and fasteners, in accordance with accepted shop drawings and manufacturers' instructions.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Select exposed framing for appearance. Install lumber materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.7 Countersink bolts where necessary to provide clearance for other work.

.8 Install specified panel product for each application.

.9 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.4 CONSTRUCTION OF TREATED WOOD FOUNDATIONS

.1 Construct preserved wood foundation in accordance with CAN/CSA-S406.

.2 Place cut ends up where studs cut to length.

.3 Treat cuts and bored holes in accordance with Section 06 05 73.

3.5 FURRING AND BLOCKING

.1 Install furring and blocking as required to space-out and support casework, cabinets, wall and, facings, fascia, siding, and other work as required.

.2 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.3 Install fascia backing, nailers and other wood supports as required and secure using galvanized fasteners.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.7 WASTE MANAGEMENT

.1 Re-use scrap lumber to the greatest extent possible. Separate scrap lumber for use on site as accessory components, including: shims, bracing, and blocking.

.2 Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill. Prevent saw dust and wood shavings from entering the storm drainage system.

.3 Do not burn scrap lumber that has been pressure treated.

.4 Do not send lumber treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

3.9 SCHEDULE OF DIMENSTION LUMBER

.1 Decking, Posts, Rails and Appearance Board:

.1 Western Red Cedar, S4S, No. 2 or better

.2 All other components:

.1 Spruce-Pine-Fir, No.2 or better, In accordance with Alberta Building Code and as specified in schedules.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM A792 Specification for Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 CGSB 37-GP-29M Sealing Compound, Rubber-Asphalt.

.3 ASTM E 330 Structural Performance.

.4 ASTM E 283 Air Infiltration.

.5 ASTM E 331 Water Penetration.

.6 SMACNA (Sheet Metal and Air Conditioning Contractor's National Association) Architectural Sheet Metal Manual specifications.

.7 ASHRAE Handbook of Fundamentals.

.8 AAMA-605-1 Finish Standards.

.9 ASTM E84 Flame Spread Rating.

.10 CSSBI Canadian Sheet Steel Building Institute.

1.2 DESIGN REQUIREMENTS

.1 Design complete roof panel system to withstand dead loads, snow load and build-up, and wind loads including uplift, calculated in accordance with National Building Code of Canada, and as shown on the Drawings.

.2 Deflection of the roof system under live loading shall not exceed 1/300th of the span.

.3 Design roof panel system to allow for thermal movement of components caused by ambient temperature range of 80°C without causing buckling, failure to joint seals, undue stress on fasteners or other detrimental effects.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Indicate arrangement of roof sheets including joints, types, and location of supports, fasteners, any special shapes, and roof penetration details.

.3 Submit a design brief for the metal roofing system including fastenings and anchorages on the Shop Drawings.

.4 Each drawing submitted shall bear the signature and stamp of a qualified Professional Engineer registered in the Province of Alberta, with the current date specific to this project.

1.4 QUALIFICATIONS

.1 The work of this section shall be carried out by experienced and competent Subcontractors. Subcontractors for this work must be authorized by the manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle in accordance with Section 01 61 00 Common Product Requirements.

.2 Protect prefinished steel during fabrication, transportation, Work Site storage, and erection in accordance with CSSBI Standards.

1.6 WARRANTY

.1 Contractor hereby warrants that the sheet metal roofing system shall remain leak proof for one year. The warranty shall commence on the date of issuance of Certificate of Substantial Performance.

Part 2 Products

2.1 MATERIALS

.1 Sheet metal roofing: aluminum-zinc alloy coated (galvalume) steel sheet to ASTM A792M, minimum grade 230, coating designation AZ150, minimum 0.81 mm (20 ga) base metal thickness, profile: interlocking standing ribs at 406 mm o.c. factory pre-coat 8000+ Series, colour: charcoal black as approved by the Departmental Representative.

.2 Roof panel support system: concealed fastener, purpose-made thermally responsive two-piece clip system, designed to accommodate panel depth and allow full thermal expansion and contraction of roof sheet. Provide clips with minimum AZ150 aluminum – zinc alloy (galvalume) or Z275 zinc coating.

.3 Ice and water shield: rubberized asphalt membrane with high density polyethylene top sheet, minimum thickness 1 mm (40 mils).

.1 Acceptable products

.1 Baker Eave Guard

.2 Grace Ice and Water Shield

.3 Meadows Air-Shield

.4 Or Approved Equivalent

.4 Flashings: material, thickness, coating and finish to match roof sheet.

.5 Closures: as recommended by roofing system manufacturer.

.6 Sealants: in accordance with Section 07 92 00 and as recommended by roofing system manufacturer.

.7 Fasteners: galvanized steel, sized by the roofing system manufacturer to meet load requirements and to maintain a watertight installation. Heads of fasteners in areas exposed to view shall have matching colour to panel material being fastened.

2.2 FABRICATION

.1 Fabricate roofing system components to comply with dimensions, profiles, thicknesses, and details as shown on the design drawings and specified herein, factory-ready for field installation.

.2 Form individual pieces in maximum practicable lengths. Make allowances for expansion at joints.

.3 Hem exposed edges on underside 12 mm, miter and seal.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance and performance.

.5 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.

Part 3 Execution

3.1 INSTALLATION

.1 Use concealed fastenings except where approved by the Departmental Representative before installation.

.2 Provide ice and water shield under sheet metal roofing installed in accordance with manufacturer's printed instructions. Lap joints 150 mm.

.3 Extend ice and water shield continuous from eave edge of roof down outside face of fascia board.

.4 Install sheet metal roof panels using concealed clips anchored to wood blocking, as recommended by manufacturer to resist uplift forces.

.5 Secure clips with minimum two fasteners each.

.6 Align transverse seams in adjacent panels.

.7 Flash roof penetrations with material matching roof panels, and make watertight.

.8 Form seams in direction of water-flow and make watertight.

3.2 V-RIB ROOFING

.1 Form roofing with batten rib seams 405 mm (16”) o.c. with straight runs of continuous full length of roof.

.2 Install exterior prefinished roof panels on panel support clips, using manufacturer's proper construction procedure.

.3 Provide notched and formed closures, sealed against weather penetration, at changes in pitch and at ridges.

3.3 FLASHING INSTALLATION

.1 Use concealed fasteners except where approved by the Departmental Representative before installation. Exposed fasteners to be same colour as roofing and flashing sheet.

.2 Lock end joints and caulk to provide weathertight seal.

3.4 TOUCH-UP AND CLEANING

.1 Touch up minor paint abrasions with touch-up paint.

.2 Clean roof by dry-wiping.

END OF SECTION

Part 1 General

1.1 DESIGN REQUIREMENTS

.1 Design metal flashings and trim to allow for thermal movement of components caused by ambient temperature range of 80°C without causing buckling, failure to joint seals, undue stress on fasteners or other detrimental effects.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 QUALIFICATIONS

.1 Only competent and qualified tradesmen shall execute the work of this section, using adequate Work Site facilities and equipment.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle in accordance with Section 01 61 00 Common Product Requirements.

.2 Protect prefinished steel during fabrication, transportation, Work Site storage, and erection in accordance with CSSBI Standards.

1.5 WARRANTY

.1 Contractor hereby warrants that the sheet metal flashings and trim shall remain leak-proof for one (1) year. The warranty shall commence on the date of issuance of Certificate of Substantial Performance.

Part 2 Products

2.1 FLASHINGS AND TRIM

.1 Sheet metal flashings, fascia’s and trims: aluminum-zinc alloy coated steel (Galvalume) sheet to CSA S136-94, grade 230, coating designation AZ150, minimum 0.61 mm (24 ga.) base metal thickness, pre-painted 8000+ Series. Colour: charcoal black as approved by the Departmental Representative.

.2 Sheet metal soffits: aluminum-zinc alloy coated steel (Galvalume) sheet to ASTM CSA S136-94, grade 230, coating designation AZ150, minimum 0.46 mm (26 ga.) base metal thickness, vented, pre-painted 8000+ Series. Colour: charcoal black as approved by the Departmental Representative.

.3 Locking Strip: same material, thickness and finish as flashings.

2.2 ACCESSORIES

.1 Isolation Coating: to CGSB 1-GP-108C.

.2 Plastic Cement: to CGSB 1-GP-5M.

.3 Slip Sheet Metal Flashing: heavy waxed Kraft paper.

.4 Fasteners: of same material as sheet metal, to CSA 35.3, flat head roofing nails of lengths and thickness suitable for metal flashing application. Colour of head to match finish of flashing.

.5 Washers: of same material as sheet metal, 1 mm thick with rubber packages.

.6 Recessed Reglet: preformed galvanized steel or aluminum channel with face and ends covered with plastic tape.

.7 Sealants: as recommended by flashings and trim manufacturer, applied in accordance with Section 07 92 00.

2.3 FABRICATION

.1 Fabricate metal flashings and other sheet metal work as detailed on drawings.

.2 Form pieces in 3000 mm maximum lengths. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm. Miter and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Fabricate soffit panels with uniform perforations providing minimum effective vent area of 3% of soffit area.

.6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

Part 3 Execution

3.1 INSTALLATION

.1 Form and install flashings as detailed or as required.

.2 Use concealed fastening except where approved before installation.

.3 Joints shall be skip-seam type with extended leg for concealed fastening and allowing for expansion and contraction. Corners shall be square, and surface shall be straight and in true planes and free from oil-canning or other defects.

.4 Install continuous metal drips, cleats, clips and starter strips as shown or required to hold flashings in true planes without deformation.

.5 Counter flash bituminous flashings at intersections of roof with vertical surfaces and curbs. Lock end joints and seal with sealant. Insert metal flashings into reglets and under cap flashing to form weathertight junction. Seal flashing at reglet with sealant.

.6 Thoroughly back-paint, with isolation coating, all aluminum coming into contact with steel or concrete to protect against galvanic action. Use slip sheets under coping flashings.

.7 Provide and install, all sealant necessary to seal between work of this Section and dissimilar materials.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM C919-18, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit product data.

.3 Manufacturer's product to describe.

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.4 Submit manufacturer's instructions that include installation instructions for each product used.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle in accordance with Section 01 61 00 Common Product Requirements.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.4 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT SELECTION

.1 At perimeter of exterior aluminum and pressed steel frames; to CAN/CGSB 19.24-M90 multi-component chemical curing polysulphide sealant, colour to match adjacent surfaces, Sternson DuoflexNS, Meadows Sealtight CM-60NS, or approved equal.

.1 Approved equal sealant: to CAN/CGSB 19.24-M90 multi-component, chemical curing polyurethane sealant, colour to match adjacent surfaces, Sternson RC-2, Sikaflex 2CNS, Tremco Dymeric, Sonneborn Sonolastic NP2, Bostik Chem-Calk 500.

.2 Approved equal sealant: to CAN/CGSB 19.13-M87 single component, elastomeric chemical curing, silicone sealant, colour to match adjacent surfaces, GE Silproof SCS2000, Tremsil 300 (Rhodorsil 3B), Dow Corning 790.

.2 Between millwork and adjacent surfaces, between ceramic tile, plumbing fixtures and adjacent surfaces; to CAN/CGSB 19-GP-22M mildew resistant silicone sealant, translucent colour, GE Sanitary SCS1701, Dow Corning 786, or approved equal.

.3 Between wood structural members, between wood and steel structural members; to CAN/CGSB 19.13-M87 single component, elastomeric, chemical curing silicone sealant, translucent colour, GE Sanitary SCS 1701, GE SCS 1201, Tremco Proglaze, Dow Corning 786 or approved equal.

.4 Between mullionless glass panes, and at perimeter of mullionless glass areas: to CAN/CGSB 19.13-M87 single component elastomeric, chemical curing, silicone sealant, clear/translucent colour, GE SCS 1201, Tremsil 300 (Rhodorsil 3B), Tremco Proglaze, Dow Corning 999-A, or approved equal.

.5 Between precast concrete walls, slab, and septic tank: Butyl rubber material in flexible rope to meet or exceed all requirements of AASIO M198 and ASTM C990 Section 6.2.

2.3 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

2.4 BACKING MATERIALS

.1 Preformed Compressible and Non-Compressible back-up materials.

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.

.1 Extruded open cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Neoprene or Butyl Rubber.

.1 Round solid rod, Shore A hardness 70.

.3 High Density Foam.

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which shall not bond to sealant

Part 3 Execution

3.1 PROTECTION

.1 Protect installed Work of other Subcontractors from staining or contamination.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant.

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes description for scope of work pertaining to the following items:

.1 Exterior Insulated Metal Doors and Frames.

.2 Door Preparation for Hardware.

.3 Installation of Doors, Frames and Hardware.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop drawings

.1 Clearly indicate each type of door, material, steel core thickness, mortises, reinforcements, location of exposed fasteners, openings, arrangement of hardware, fire ratings, special features and finishes.

.2 Clearly indicate each type of frame, material, steel core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, fire ratings and finishes.

.3 Include schedule identifying each unit with door marks and numbers relating to numbering on drawings and door schedule.

.3 Closeout Submittals

.1 Provide maintenance and operational data for incorporation into operation and maintenance manual.

Part 2 Products

2.1 MANUFACTURE

.1 Manufacture hollow metal doors and frames to standards published by the Canadian Steel Door and Frame Manufacturer’s Association (CSDFMA).

2.2 MATERIALS

.1 Exterior Doors: Commercial grade steel to ASTM A568.81, Class 1, hot-dip galvanized to ASTM A527.80, coating designation to ASTM A527.81, ZF75, minimum base steel thickness 1.5 mm, mechanically interlocked adhesive sealed edges, completely filled with rigid extruded closed cell polystyrene insulation (minimum density 28 kg/m3). Door to be delivered to Work Site clearly labelled "Polystyrene Insulated". Label to also show name of manufacturer. Labels to remain on doors until doors installed and inspected.

.2 Reinforcement for hardware: carbon steel, welded in place, prime painted, to the following gauges:

.1 Hinge, pivot and panic bar reinforcement: 4.76 mm

.2 Lock face, flush bolts, concealed bolts: 2.78 mm

.3 Concealed or surface closer reinforcement: 2.78 mm

.4 Other surface hardware reinforcements: 2.78 mm

.3 Frames for doors: 1.6 mm thickness, commercial quality steel cold rolled to ASTM A366, zinc coated to ASTM A527 ZF075, frame depth to accommodate wall thickness. Refer to Drawings for details.

.4 Glazing stops: 16 mm high formed channel, 0.95 mm steel galvanized, miter joints, counter sink for oval-head screws.

.5 Primer: to CGSB 1-GP-173a.

.6 Door Silencers: single stud rubber/neoprene type.

2.3 FABRICATION

.1 Manufacture doors in accordance with details and approved shop drawings and ULC requirements.

.2 Refer to drawings for required door types and other requirements.

.3 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided.

.4 Join door faces at intersecting edges with spot welds, fill and grind smooth. Finish door faces flush without visible joints or distortion.

.5 Close top and bottom edges of door with recessed 18 gauge steel channel, full width welded. Provide flush closure channels at top and bottom edges of exterior doors. Provide weep holes in exterior door bottom channel.

.6 Make provisions for glass. Provide glazing stops. Weld stops to door on security side.

.7 Touch-up doors by priming areas where zinc coating is damaged.

.8 Provide astragals for pairs of doors in accordance with ULC requirements.

.9 Profile edge of doors as follows:

.1 Single acting swing doors - bevel 3 mm in 50 mm.

.2 Provide reverse bevel edges at meeting stiles on exterior double doors which are scheduled to receive interior and exterior weatherstrip/astragals.

Part 3 Execution

3.1 INSTALLATION

.1 Install doors and frames to CSDFMA Installation Guide.

.2 Install labeled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.3 Install steel hollow metal frames plumb and square, in correct locations indicated on drawings and with a maximum diagonal distortion of 3 mm. Ensure frames are securely and rigidly anchored to adjacent construction.

.4 Brace frames solidly to maintain in position while being built-in.

.5 Coordinate grouting of frames solid to adjacent construction.

.6 Fill dimples in frames and screw heads with metal paste and sand smooth.

.7 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.8 Fill metal frames in concrete walls with grout.

.9 Install doors, transom panels and hardware in accordance with templates and manufacturer’s instructions. Maximum permissible warp of 3 mm measured diagonally across' door.

.10 Caulk perimeter of frames between frame and adjacent material.

.11 After installation, touch up all scratched or damaged surfaces. Use a type of primer recommended for galvanized surfaces.

.12 Adjust operable parts for correct function.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes description for scope of work pertaining to the following items:

- .1 Hardware for all Metal Doors and Frames.
- .2 Supply of Templates to Door Frame Manufacturers.
- .3 Master Keying System.
- .4 Temporary construction locksets on all exterior doors.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop drawings

- .1 Provide detailed list from hardware schedule including design, finish, catalogue identification, reference identification to specified standards.
- .2 Provide templates to door and frame manufacturer for accurate shop fabrication and sizing.

1.3 DELIVERY / STORAGE

.1 Package each item of hardware separately or in like groups.

.2 Include installation templates, screws, keys and instructions.

.3 Maintain inventory list with hardware schedule.

1.4 MASTER KEYING

.1 Key door locks to existing master key system.

.2 Provide two (2) keys for every lock cylinder supplied.

.3 Review keying with the Departmental Representative before placing order for locksets.

1.5 TURNOVER

.1 Upon completion of work, provide the Departmental Representative with a manufacturer's parts list, manufacturer's instructions for door closers, locksets, door holders and panic hardware, two (2) sets of wrenches for door closers and locksets, and four (4) additional of hand handle sets with locks and keys.

.2 Brief the building maintenance staff regarding the proper care of hardware such as lubrication of locksets, adjustments of door closers, cleaning and general maintenance.

Part 2 Products

2.1 MATERIALS

.1 All items shall be supplied with ancillary brackets, shims, etc., to suit the door installation and operation as shown on the drawings.

.2 Include with the hardware items, all necessary screws, bolts, expansion shields, etc. for proper installation.

.3 All knobs, levers, locks and latches shall have temporary plastic covers.

2.2 MANUFACTURERS

.1 Refer to hardware schedule. Hardware as manufactured by the following manufacturers, or approved equivalent, has been specified.

Butts	-	McKinney
Lock Protectors	-	Ives
Locksets	-	Schlage
Panic Hardware	-	Sargent / Corbin
Door Closers	-	Sargent
Holders	-	Sargent
Flushbolts, Coordinators	-	Rockwood
Door Stops	-	Rockwood
Weatherstripping, Sweeps	-	Pemko (unless noted otherwise)
Thresholds	-	Pemko

Part 3 Execution

3.1 EXECUTION

.1 Carry out work with proper templates supplied by manufacturer.

.2 Clean and polish all hardware including adjacent affected work to the approval of the Departmental Representative.

.3 Prepare hardware for installation to the following measurements from finished floor to centre line of component:

- Door Pull 1143 mm
- Push Plate 1143 mm
- Door Bar 1067 mm
- Door Knob 1024 mm
- Dead Lock 1524 mm

3.2 SCHEDULE

.1 Hardware Group 1 – Exterior Single Doors (hardware specified per door; product to be per manufacturer identified, or approved equivalent)

Hardware/Quantity (Per Door)	**Manufacturer's Number**	**Finish**
3 Hinges	TA2314 - 114 x 104 NRP	C32D
1 Corbin Panic Device	ED5200 x PR959	630
1 Closer / Holder	SRI-421-PCHTB-EN	689
1 Lock Protector	LP1	C32D
1 Kickplate	K1050 250 x 860	C32D
1 Weatherstrip	375CR	AL
1 Sweep	3151CN	AL
1 Threshold	252x3AFG	AL

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Refer to Parks Canada, Exterior Signage Standards and Guidelines – Version 1, March 2007.

.2 Refer to Manual of Uniform Traffic Control Devices for Canada, Fifth Edition, January 2014.

.3 Refer to Alberta Transportation Standard Specification for Highway Construction 2013.

.4 Section 01 27 00 – Measurement and Payment

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for traffic and other signage, including product characteristics, performance criteria, physical size, finish and limitations.

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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

1.4 GENERAL INSTALLATION AND LAYOUT

.1 The Department Representative will provide plan layout information in the form of a base line for the installation of the permanent signs. The Contractor shall establish the height and elevation of the sign and install in accordance with the Drawings or as directed by the Department Representative

Any adjustments to the locations of signs will be subject to the approval of the Department Representative and no additional cost will be incurred.

The soil at the bottom of the holes shall be thoroughly compacted to provide a firm bearing. The post shall be set vertically and backfilled with material free of organics. All back shall be placed in thin layers and thoroughly compacted for the full depth. The disturbed area around installations shall be restored to the original contours.

1.5 INSTALLATION OF WOODEN POST

.1 Installation of the signs are to be carried out as follows:

.1 All signs shall be installed on 100mm x 100mm timber posts pressure treated to PWF standards.

.2 Minimum of 300mm Diameter drilled hole to a minimum of 1.2m below ground surface. If the sign is to be installed in the parking lot, drill the hole through asphalt pavement.

.3 Backfill around the post(s) with crushed granular material in 150mm compacted lifts. The top final 150mm lift around the post(s) located in the asphalt parking lot shall consists of compacted asphalt material to finish grade.

.4 The post(s) to be plumbed, if not plumbed, Contractor shall remove and re-install at no additional expense.

.5 Contractor shall supply the hardware and install the sign(s) on the post(s) with the approval of the Department Representative.

.6 The measured vertical distance from the bottom of the sign(s) to the asphalt surface is 1.7m. For sign(s) installed off the asphalt surface the 1.7m vertical distance still applies.

1.6 INSTALLATION OF SIGNS

.1 The installed sign shall be clean and not bent or twisted. The reflectorized surface shall be free of scratches and marks and must be securely fastened to the post or frame.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 91 19.13 Topsoil Placement and Finish Grading

.2 Section 31 22 13 Rough Grading

1.2 REFERENCES

.1 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

Part 2 Products

2.1 Not Used

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 STRIPPING OF TOPSOIL

.1 Ensure that procedures are conducted in accordance with applicable Federal and Provincial requirements.

.2 Remove topsoil before construction procedures commence to avoid compaction of topsoil.

.3 Handle topsoil only when it is dry and warm.

.4 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by the Departmental Representative.

.5 Remove vegetation from target areas by non-chemical means and dispose of stripped vegetation off site at a designated facility.

.6 Commence topsoil stripping after area has been cleared of weeds, brush, grasses and removed from site.

.7 Strip topsoil to depths required.

.1 Avoid mixing topsoil with subsoil.

.8 Pile topsoil in berms in locations as directed by the Departmental Representative.

.1 Stockpile height not to exceed 2.5 - 3 m.

.9 Dispose of unused topsoil off-site at a designated facility.

.10 Protect stockpiles from contamination and compaction.

.11 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

3.3 PREPARATION OF GRADE

.1 Verify that grades are correct and notify Departmental Representative if discrepancies occur do not begin work until instructed by Departmental Representative

.1 Grade area only when soil is dry to lessen soil compaction.

.2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.4 CLEANING

.1 On completion and verification of performance, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 19 19.13 Topsoil Placement and Finish Grading

.2 Section 32 11 23 Aggregate Base Courses

.3 Section 31 14 13 Soil Stripping and Stockpiling

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D698-[07e1], Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3).

1.3 EXISTING CONDITIONS

.1 Examine subsurface investigation report available from Departmental Representative.

.2 Known underground and surface utility lines and buried objects are as indicated on site plan.

Part 2 Products

2.1 MATERIALS

.1 Fill material: Selected material from excavation or other sources, approved by the Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.2 Excavated or graded material existing on site suitable to use as fill for grading work if approved by the Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

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

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

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

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

3.2 STRIPPING OF TOPSOIL

.1 Refer to Section 31 14 13 Soil Stripping and Stockpiling.

3.3 GRADING

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated on the Drawings.

.2 Rough grade to following depths below finish grades:

- .1 150 mm for seeded areas.
- .2 250 mm for pedestrian concrete paving.

.3 Slope rough grade away from building.

.4 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.

.5 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:

- .1 85 % under landscaped areas.
- .2 95 % under paved and walk areas.

.6 Do not disturb soil within branch spread of trees or shrubs to remain.

3.4 TESTING

.1 Inspection and testing of soil compaction shall be carried out by testing laboratory designated by ULC. Costs of tests shall be paid by the Contractor.

.2 Submit testing procedure, frequency of tests, to the Departmental Representative for approval.

.3 Submit test results to Departmental Representative.

3.5 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

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

3.6 PROTECTION

.1 Protect existing trees, fencing, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by the Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 RESERVATION OF MATERIAL

.1 Whenever gravel, sand, topsoil, or any other material suitable for special use is encountered, it shall be deemed to be the property of the Banff National Park.

.2 Where layers of gravel or gravely mixtures are encountered, suitable materials shall be excavated separately from other excavation and shall be stockpiled at Banff National Park or incorporated into the work as base material after testing the material in a laboratory to determine the grain size distribution and CBR values.

3.2 DISPOSAL OF MATERIAL

.1 Where excavated material is not specifically directed to be used as fill or for any other purpose, the Contractor shall be required to haul the material from site to an approved disposal site. There is no separate payment for this work and is considered included in the subgrade preparation unit payment.

.2 All materials deemed to be in excess of requirements or unsuitable shall be disposed of appropriately by the Contractor outside of Banff National Park.

3.3 FINISHING AND COMPACTING SUBGRADE

.1 The excavated sections shall be ploughed to a depth of at least 150 mm below the surface of the subgrade and replaced and compacted to a minimum of ninety eight percent (98%) of Standard Proctor Density. The cut shall be left sufficiently high so that the surface after compaction can be trimmed to the final grade, and any loose material resulting from this operation removed. All depressions caused by the finishing rollers shall be removed during the final blading operation. Finished subgrade surfaces shall be within plus or minus 30 mm of established grade, but not uniformly high or low.

3.4 EXCAVATION BELOW GRADE

.1 Unsuitable Materials: When topsoil, muskeg, or other soft areas are encountered below the finished subgrade, which in the opinion of the Departmental Representative require

removal, the area shall be undercut and the unsuitable material excavated, loaded and disposed of outside of Park. These materials shall be replaced with granular sub-base course gravel.

.2 Placing Fill: Fill material shall be placed in successive horizontal layers not exceeding 150 mm.

.3 Compaction: The compaction shall be sufficient to obtain a minimum density of 98% of maximum dry density in accordance with ASTM D698 (Method C or D), unless otherwise stated in the specifications. Where it is necessary to add or remove moisture from the soil to obtain the compaction, it shall be done as part of the requirements of this section.

3.5 COMPACTION PROCEDURES

.1 The following tests shall be employed to establish compaction procedures:

.1 The maximum dry density of the soil shall be determined by ASTM procedure D-698 (Moisture Density Relationships of soils), to be determined for each soil type. The optimum moisture content of the soil shall be determined from the laboratory compaction curve established.

.2 Fill material shall be placed in compacted lifts at a moisture content within ±2% of the optimum moisture content.

.3 The field density of soils shall be determined by ASTM D-2922 – Determining density of soil and soil aggregate in place by nuclear methods (shallow depth).

.4 The exposed subgrade should be proof rolled using a heavily loaded gravel truck or equivalent piece of equipment to identify any soft areas undetected during site grading. Proof rolling should be completed under the supervision of qualified technical personnel. Recommendations pertaining to the repair of soft areas shall be provided at the time of inspection but may include subcutting the subgrade.

3.6 NORMAL COMPACTED THICKNESSES OF LIFTS

.1 The following table shows normal compacted thicknesses of lifts:

Equipment Type	Cohesive Soils	Non-Cohesive Soils
Vibratory Sheepsfoot Packer	300 mm	300 mm
Sheepsfoot Packer	200 mm	--
Pneumatic Tire	200 mm	200 mm
Vibratory Roller	150 mm	300 mm
Pneumatic Tamper	100 mm	100 mm
(contact area < 130 sq cm)		
Pneumatic Tamper	100 mm	100 mm
(contact area > 130 sq cm)	100 mm	100 mm
Mechanical Tamper		
(diesel or gas – jumping jack)	100 mm	200 mm

.2 Thickness of lifts for other equipment shall be determined by laboratory testing procedures during the construction process. The Departmental Representative may grant approval in writing to alter lift thicknesses upon evidence of satisfactory compaction at other lift thicknesses.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes description for scope of work pertaining to the following items:

- .1 Excavation to elevations indicated on Drawings.
- .2 Excavation for foundations and structures.
- .3 Shoring and bracing in excavations.
- .4 Backfilling and compaction around foundations and structures.
- .5 Disposal of surplus excavated material.

1.2 RELATED WORK

.1 Section 03 10 00 – Concrete Formwork and Falsework.

.2 Section 03 30 00 – Cast In Place Concrete

1.3 REFERENCES

.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, 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 Canadian Construction Safety Code, National Research Council of Canada.

.6 National Building Code of Canada 2010.

.7 Occupational Health and Safety (OH&S) Act, Regulation, and Code 2009.

1.4 CODES AND REGULATIONS

.1 Comply with excavation and trenching regulations of Provincial and Municipal authorities.

.2 Conform to requirements of the National Building Code, the Canadian Construction Safety Code, and the Occupational Health and Safety Act of Alberta.

1.5 PROTECTION

.1 Protect fences, trees, shrubs and lawns, areas to receive planting, and other features remaining as part of final landscaping.

.2 Protect bench marks, structures, roads, sidewalks, paving, and curbs against damage.

.3 Protect excavations by shoring, bracing, sheet piling, or by other methods, as required to prevent cave-ins or loose dirt from falling into excavations.

.4 Underpin and support structures, service lines and piping which shall or may be damaged by excavation work.

.5 Notify Departmental Representative of any unexpected subsurface conditions.

.6 Discontinue work in the area until Departmental Representative provides notification to resume work.

.7 Protect bottom of excavations and soil around and beneath foundations and structures from frost.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

1.7 COMPACTION TESTING

.1 Testing shall be in accordance with Section 01 45 00 – Quality Control.

.2 Third party testing of compacted fill materials shall be the responsibility of the Contractor.

.3 Tests shall be performed on all re-compacted subgrade and each lift of compacted material. One (1) test shall be performed for each 100 m² of compacted material area. Tests shall be uniformly distributed over the work area.

.4 Tests are to be performed in accordance with ASTM D698 for Standard Proctor Density.

.5 When work of this section or portions of work are completed to own satisfaction, notify the Testing Firm to perform density tests. Do not proceed with additional portions of work until results have been verified and approved.

.6 If, during progress of work, tests indicate that compacted materials do not meet the specified requirements, remove defective work, replace and retest at own expense, as directed by the Departmental Representative.

.7 Ensure compacted fills are tested and approved before proceeding with placement of surface materials.

Part 2 Products

2.1 FILL AND BACKFILL MATERIALS

.1 All materials to be subject to Departmental Representative 's approval.

.2 Granular materials to be composed of sound, hard, uncoated particles, free from injurious quantities of clay or silt sized particles, flaky particles, soft shale, friable materials, roots, organic matter and frozen lumps.

.3 Grading of granular materials to show no marked fluctuations between opposite ends of extreme limits.

.4 Type 1: pit run gravel graded within the following limits:

Sieve Size (Square Opening)	Per Cent Passing
80 mm	100
50 mm	55-100
25 mm	38-100
16 mm	32-85
5 mm	20-65
315 micrometer	6-30
80 micrometre	2-10

.5 Type 2: crushed gravel graded within the following limits:

Sieve Size (Square Opening)	Per Cent Passing
25 mm	100
20 mm	82-97
16 mm	70-94
10 mm	52-79
5 mm	35-64
1.25 mm	18-43
630 micrometer	12-34
315 micrometer	8-26
160 micrometer	5-18
80 micrometre	2-10

.6 Type 4: pea gravel, clean natural stone, 6 mm to 13 mm particle size.

.7 Type 5: excavated earth free from roots, stones larger than 75 mm in size and building debris. Fill under landscaped areas to be free from alkali, salt, petroleum products and other materials detrimental to plant growth. Use subsoil excavated from site only if approved by Departmental Representative and if conforming to requirements for Type 5.

.8 At least 60% of material retained on 5mm Sieve to be fractured material.

Part 3 Execution

3.1 PREPARATION AND LAYOUT

.1 Establish extent of excavation by area and elevation. Designate and identify datum elevations.

.2 Set out all lines and levels as indicated on Drawings and required for proper excavation. Clearly indicate, by stakes, areas to be excavated.

.3 Maintain bench marks, monuments, and other reference points. Re-establish if disturbed or destroyed, at no additional cost to Departmental Representative.

.4 Erect batter boards and securely anchor.

3.2 UTILITIES

.1 The presence of utilities on-site is not anticipated; however, prior to commencement of excavation work, the Contractor shall undertake all necessary work to establish location and extent of all underground utilities occurring in work area, at no additional cost to the Departmental Representative. Notify the Departmental Representative if any utilities are located for direction prior to proceeding with the excavation work.

3.3 EXCAVATION

.1 Excavate to elevations and dimensions indicated on Drawings plus space required to erect formwork, and for reviews.

.2 Perform additional excavation only by written authorization of Departmental Representative.

.3 Machine slope banks of all excavated areas.

.4 All temporary excavations to comply with current OH&S requirements regarding safe excavations and side slopes. Any excavation depths or side slope angles outside of the safe working limits shall be designed and stamped by a qualified Geotechnical Engineer registered in the Province of Alberta and submitted to the Departmental Representative for review and approval.

.5 Hand trim and leave excavations free from loose material and organic matter.

.6 Correct unauthorized or insufficient excavations as directed by the Departmental Representative at no additional cost to the Departmental Representative.

.7 Fill over-excavated areas under structure bearing surfaces with concrete as specified for foundations.

.8 Excavations are not to encroach on normal 45° bearing support under any foundation.

.9 Make good all damage occurring as a result of inadequate, unauthorized, or defective methods of protection.

.10 Removal of boulders and buried concrete in excess of 0.4 m^3 shall be considered as rock removal and is not within the scope of this Section.

.11 Remove concrete, paving, walks, demolished foundations and rubble and other obstructions encountered in the course of excavation. Cut pavement and concrete to neat lines at excavations.

3.4 TOLERANCES

.1 General excavation shall be to the elevations indicated on Drawings, ±50 mm.

3.5 SHORING / BRACING

.1 Provide all shoring and bracing required to prevent damage to excavations and injury to personnel.

.2 Comply with all applicable rules and regulations of governmental authorities.

3.6 DEWATERING

.1 Keep excavations dry at all times. Provide necessary equipment including pumps, piping and temporary drains and trenches.

.2 Do not discharge dewatering lines into site drainage system without weirs or other control devices to limit rate of flow into the system to be less than or equal to its current capacity.

.3 Ensure water discharge does not contain silt held in suspension and shall not clog downstream flows.

.4 Direct surface drainage away from excavated area. Do not allow spillage over embankments.

.5 Control grading in and adjacent to excavations to prevent water running into excavated areas or onto adjacent properties or public thoroughfares.

.6 Furnish and operate suitable pumps on a 24-hour basis to keep excavations free of water until foundations have been placed.

.7 Water flow over fresh concrete is not permitted. Do not pump during placing of concrete and for at least 24 hours after, unless from sumps separated from concrete with watertight walls or bulkheads.

3.7 FINISHING SURFACES

.1 Finished excavated surfaces are to be in neat condition, true to lines, levels, and grades.

.2 When acceptable trimming is not obtainable by mechanical means, hand finish area.

3.8 PREPARATION FOR BACKFILLING

.1 Do not commence backfilling operations until mechanical and electrical services and drainage systems have been inspected and approved by Departmental Representative.

.2 Ensure areas to be backfilled are free from debris, snow, ice and water and that ground surfaces are not in a frozen condition.

.3 Do not use frozen backfill.

.4 Do not backfill over existing subgrade surfaces which are porous, wet or spongy.

.5 Scarify exposed subgrade to a minimum depth of 200 mm and compact to 100% SPMDD.

3.9 BACKFILLING, FILLING

.1 Backfill and fill to grades, contours, levels, and elevations indicated on Drawings.

.2 Slope finished subgrade at a minimum gradient of 1% away from building towards catch basins and parking areas to reduce potential for swelling.

.3 Where temporary unbalanced pressures are liable to develop on walls, erect necessary shoring to counteract imbalance.

.4 Backfill simultaneously on both sides of foundation walls and pedestals to equalize soil pressures.

.5 Place and compact materials in continuous layers not exceeding 150 mm loose depth. Prevent disturbance to buried services, drainage lines, and waterproofing.

.6 Maintain optimum moisture content of materials to permit compaction to specified densities.

.7 Compact fill and backfill to specified densities.

3.10 FILL TYPES AND COMPACTION

.1 Compaction densities indicated herein are based on ASTM D698 for Standard Proctor Density.

.2 Within building area, under concrete aprons, sidewalks and graveled drive areas: Minimum 300 mm of Type 2 fill to underside of slabs-on-grade. Compact to 100% of SPMDD within ±2% of optimum moisture content in maximum 150 mm compacted thickness lifts.

.3 Exterior Side of Building Foundations: Type 5 fill to subgrade elevation unless noted otherwise. Compact to 95% of SPMDD within +/- 2% of optimum moisture content in maximum 150mm compacted thickness lifts.

.4 All backfill shall be compacted using mechanical equipment. Do not compact backfill within 0.3m of structures. From 0.3m to 1.5m away from structures, compact with a walk-behind vibratory roller with a maximum weight of 1000kg.

.5 Do not place backfill against foundation walls until the main floor is complete and suitably braced.

3.11 SURPLUS MATERIAL

.1 Stockpile excavated subsoil, boulders/rock, etc. for re-use as directed by Departmental Representative.

.2 Remove and dispose of surplus excavated material off site.

.3 Remove all excavated concrete, masonry, paving, walks, demolished foundations and rubble from the site.

3.12 CLEAN UP

.1 As excavation proceeds, keep roads, streets and sidewalks clear of dirt and excavated material.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 DEFINITIONS

.1 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 mm in any dimension.

.2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 EXISTING CONDITIONS

.1 Buried services:

- .1 Before commencing work verify location of buried services on and adjacent to site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
- .3 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .4 Prior to beginning excavation Work, notify applicable Departmental Representative, establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
- .5 Confirm locations of buried utilities by careful soil hydrovac methods.
- .6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
- .7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to paid by the Departmental Representative.
- .8 Record location of maintained, re-routed and abandoned underground lines.
- .9 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:

- .1 Conduct, with Departmental Representative condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Backfill material for top dressing roadway sideslopes, disturbed areas, and landscape rehabilitation adjacent to new concrete slabs and curbs: Topsoil.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

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

.2 Sawcut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly in accordance with Section 02 41 13 - Selective Site Demolition.

.3 Strip topsoil from work areas to the full depth of organic material.

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 Departmental 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 Departmental Representative.

.1 Protect fill materials from contamination.

.2 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 DEWATERING AND HEAVE PREVENTION

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

.2 Provide for Departmental Representative's approval details of proposed dewatering or heave prevention methods.

.3 Protect open excavations against flooding and damage due to surface run-off.

.4 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved areas and in a manner not detrimental to public and private property, or portion of Work completed or under construction.

3.6 EXCAVATION

.1 Advise Departmental Representative at least two days in advance of excavation operations.

.2 Excavate to lines, grades, elevations and dimensions as directed by Departmental Representative.

.3 Remove concrete, asphalt, walks and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.

.4 Excavation must not interfere with bearing capacity of adjacent foundations.

.5 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.6 Keep excavated and stockpiled materials safe distance away from edge of trench.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material outside of Park.

.9 Do not obstruct flow of surface drainage.

.10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.11 Notify Departmental Representative when bottom of excavation is reached.

.12 Obtain Departmental Representative approval of completed excavation.

.13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.14 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.

3.7 RESERVATION OF MATERIAL

.1 Whenever gravel, sand topsoil, or any other material suitable for special use is encountered, it shall be deemed to be the property of the Banff National Park.

3.8 DISPOSAL OF MATERIAL

.1 Excavated materials shall be utilized as fill if required on any portion of the work being carried out under this Contract.

.2 All materials deemed to be in excess of requirements or unsuitable shall be disposed of appropriately by the Contractor outside of Banff National Park.

3.9 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.

.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.

3.10 RESTORATION

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

.2 Reinstate lawns to elevation which existed before excavation.

.3 Reinstate pavements disturbed by excavation to thickness, structure and elevation in accordance with the specifications, drawings, or as directed by the Departmental Representative.

.4 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.5 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 22 13 Rough Grading

1.2 REFERENCE STANDARDS

.1 ASTM International

- .1 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft3) (600kN-m/m3).
- .5 ASTM D1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft3) (2,700kN-m/m3).
- .6 ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .7 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 MEASUREMENT PROCEDURES

.1 Aggregate base shall be based on the actual quantities measured onsite and the unit prices stated in the Bid and Acceptance Form.

.2 Aggregate under slabs and piles are incidental to, Section 03 41 00 – Precast Structural Concrete.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Storage and Handling Requirements:

- .1 Stockpile minimum 50% of total aggregate required prior to beginning operation.
- .2 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .1 Stockpile as directed by Departmental Representative on paved areas only and in a location to minimize environmental impacts to adjacent landscaping and in accordance with 31 05 16 Aggregate for Earthwork.
- .3 Replace defective or damaged materials with new.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 MATERIALS CERTIFICATION

.1 Aggregates: At least one week prior to commencing work provide:

.1 Test data reports representing granular base processed into stockpile. Submit one (1) complete aggregate gradation analysis report for every 1,000 tonnes of each material required for the project or one complete analysis for each production day when production is less than 1,000 tonnes. Include percentage of crushed coarse aggregate particles in reports.

.2 Certification that the physical properties of the aggregates meet the requirements of this section.

.3 Reports and certification shall be provided by an independent testing consultant under the signature and professional seal of a qualified materials engineer.

2.2 GRANULAR BASE

.1 Granular base: material in accordance with Section 31 05 16 - Aggregate for Earthwork and following requirements:

.1 25mm Crushed stone or gravel.

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

.2 Physical properties of Aggregates:

% Fracture, by weight (2 faces)	60 min.
Los Angeles Abrasion, loss, %	45 max.
Liquid Limit, %	25 max.
Plasticity Index, %	6 max.
Lightweight Particles, %	5 max.
California Bearing Ratio, when compacted to 100% of ASTM D698	80 min.

.3 Gradation to be within the following limits when tested to ASTM C-117 with sieve sizes to CAN/CGSBD 8-GP-2M rather than ASTM E11, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

Sieve Size	Percent Passing by Weight
25 000	100
16 000	73-94
10 000	56-80
5 000	40-66
1 250	24-45
315	13-27
160	9-19
80	4-10

Part 3 Execution

3.1 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

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

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

3.2 PLACING

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

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

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

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

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

3.3 COMPACTING

.1 Ensure compaction equipment is capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Departmental Representative before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

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

.5 Compact to density not less than 98% of maximum dry density in accordance with ASTM D698 (Method C or D).

.6 Shape and compact alternately to obtain a smooth, even and uniformly compacted sub-base.

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

3.4 PROOF ROLLING

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain written approval from the Departmental Representative to use non standard proof rolling equipment.

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

.4 If use of non standard proof rolling equipment is approved, the Departmental Representative to determine level of proof rolling.

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

.6 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by the Departmental Representative.

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

.7 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by the Departmental Representative and replace with new materials in accordance with Section 31 05 16 Aggregate for Earthwork and this section at no extra cost.

3.5 FINISH TOLERANCES

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

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

3.6 MAINTENANCE

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

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Samples:

.1 Sample asphalt tack coat material to ASTM D 140 and provide test results to illustrate its compliance with the Contract Specifications.

.2 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work to ASTM D 140.

1.3 QUALITY ASSURANCE

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

1.4 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, labeled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect asphalt tack coats from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Deliver, store and handle materials in accordance with ASTM D 140.

.5 Provide, maintain and restore asphalt storage area.

Part 2 Products

2.1 MATERIALS

.1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade SS-1h.

.2 Cut-back asphalt: to AASHTO M081-92-UL, grade RC-70 or RC-250.

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

2.2 EQUIPMENT

.1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.

.2 Pressure distributor:

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

.1 Maintained at even temperature.

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

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

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

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

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

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

.1 Measure temperature to closest whole number.

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

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

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

.8 Cleaned if previously used with incompatible asphalt material.

Part 3 Execution

3.1 APPLICATION

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

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

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

.3 Apply asphalt tack coat evenly to pavement surface at 0.5 L/ m^2.

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

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

.6 Apply asphalt tack coat only on unfrozen surface.

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

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

.1 Control traffic in accordance with Section 01 35 00.06 - Special Procedures for Traffic Control.

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

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

.11 Permit asphalt tack coat to set before placing asphalt pavement.

.12 Submit summary report within 3 days minimum of date of application and include information as follows:

.1 Total area tack coated.

.2 Quantity of tack coat used.

.3 Mean application rate.

.4 Actual product quantity used when using equipment on pressure distributors.

.5 Dipstick measurements or electronic printouts are acceptable.

.13 Carry out measurements in presence of Departmental Representative upon request.

.14 Inspect tack coat application to ensure uniformity.

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

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

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Storage and Handling Requirements:

.1 Deliver, store and handle materials to ASTM D 140.

.2 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.3 Store and protect asphalt prime coats from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIAL

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

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

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

2.2 EQUIPMENT

.1 Pressure distributor:

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

.1 Maintained at even temperature.

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

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

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

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

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

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

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

.1 Temperature to be measured to nearest whole number.

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

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

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

.8 Cleaned if previously used with incompatible asphalt material.

.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.

Part 3 Execution

3.1 APPLICATION

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

.2 Cutback asphalt:

.1 Heat asphalt prime for pumping and spraying.

.2 Apply asphalt prime to granular base at rate as directed by Departmental Representative.

.3 Apply on dry surface unless otherwise directed by Departmental Representative.

.3 Anionic emulsified asphalt:

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

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

.3 Apply diluted asphalt emulsion at 3.0L/m^2.

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

.4 Apply asphalt prime only on unfrozen surface.

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

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

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

.8 Prevent overlap at junction of applications.

.9 Do not prime surfaces that shall be visible when paving is complete.

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

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

.1 Control traffic in accordance with Section 01 35 00.06 - Special Procedures for Traffic Control.

.12 Permit prime to cure before placing asphalt paving.

3.2 USE OF SAND BLOTTER

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

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

.3 Apply second application of sand blotter as required.

.4 Do not roll blotter sand.

.5 Sweep and remove excess blotter material.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

.1 End Product Specification (EPS) – A specification whereby the methods of construction are not defined. Under EPS the Departmental Representative shall monitor the Contractor's control of the process that produces the items of construction and shall accept or reject the end product according to a specified acceptance plan. The Contractor is responsible for quality control. End product acceptance, including quality acceptance is the responsibility of the Departmental Representative.

.2 Lot – A Lot is a portion of the Work being considered for acceptance, and is defined as the following:

.1 The entire project quantity for each mix type.

.2 At the Departmental Representative's discretion, any portion of the Work may be deemed a Lot.

1.2 MEASUREMENT AND PAYMENT

.1 Measure asphalt concrete paving in tonnes of asphalt concrete actually incorporated into the Work, as described in Section 01 27 00 – Measurement and Payment.

1.3 REFERENCES

.1 Alberta Transportation (AT)

.1 Alberta Transportation Standard Specifications For Highway Construction, 2013.

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

.1 AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.

.2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.

.3 AASHTO T245-97(2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

.3 Asphalt Institute (AI)

.1 AI MS-2-Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.4 ASTM International

.1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.

.4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

.5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

.6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.7 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.8 ASTM C207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.

.9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.10 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.11 ASTM D3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

.6 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C 2 weeks prior to beginning Work.

.3 Test and Evaluation Reports:

.1 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for approval at least 2 weeks prior to beginning Work.

.2 Submit printed record of mix temperatures at end of each day.

.4 Sustainable Design Submittals:

.1 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction.

1.5 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. Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.

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

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

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

.6 Submit to Departmental Representative copies of freight and waybills for asphalt cement as shipments are received.

.1 Departmental Representative reserves right to check weights as material is received.

.7 Stockpile crushed RAP separately in accordance with Section 31 05 16 - Aggregate Materials as indicated where directed by Departmental Representative.

.8 Protect and cover stockpiles of crushed RAP from rain to approval of Departmental Representative in accordance with erosion and sedimentation control plan

Part 2 Products

2.1 MATERIALS

.1 Per Alberta Transportation Mix Type M1 (PG 58-28)

2.2 EQUIPMENT

.1 Per Alberta Transportation Mix Type M1 (PG 58-28)

2.3 MIX DESIGN

.1 Per Alberta Transportation Mix Type M1 (PG 58-28)

.2 Mix design to be approved in writing by Departmental Representative.

Part 3 Execution

3.1 GENERAL

.1 Per Alberta Transportation Standard Specifications for Highway Construction (2013).

.2 The Departmental Representative shall have access to all production processes and materials used for the work to monitor material quantity as often as deemed necessary. Such inspection and testing shall not relieve the Contractor of the responsibility for meeting the requirements of this specification.

3.2 MILLED TIE-INS

.1 Milled tie-ins are required at locations noted on the Drawings as “tie to existing”, as required to ensure a smooth and protected transition from existing paved surface to new paved surfaces, or as directed by the Departmental Representative.

.2 All costs associated with the milled tie-ins shall be considered incidental to the Work and no separate or additional payment shall be made.

3.3 QUALITY CONTROL

.1 Per Alberta Transportation Standard Specifications for Highway Construction (2013).

.2 Quality Control is the responsibility of the Contractor throughout every stage of the work from aggregate processing to the final accepted product. Tests performed by the Departmental Representative shall not be considered as Quality Control tests.

.3 The Contractor shall be totally responsible for production of materials and construction that meets all specified requirements.

.4 All quality control shall be conducted by qualified personnel. The Contractor shall bear the cost of all quality control testing and consulting services.

3.4 FINISH TOLERANCES

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

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

3.5 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.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures and Section 01 35 00.06 - Special Procedures for Traffic Control.

1.2 MEASUREMENT AND PAYMENT

.1 In accordance with Section 01 27 00 – Measurement and Payment.

1.3 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM E 1360 90 (2000) e1, Standard Practice for Specifying Color by Using the Optical Society of America Uniform Color Scales System.

.2 ASTM D 4797 88(2004) Standard Test Methods for Chemical and Gravimetric Analysis of White and Yellow Thermoplastic Traffic Marking Containing Lead Chromate and Titanium Dioxide.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.1 MPI #32, Traffic Markings Paint, Alkyd.

.2 MPI #97, Latex Traffic Marking Paint.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

1.5 CLOSEOUT SUBMITTALS

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

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

.1 The Contractor shall be totally responsible for quality control inspection throughout every stage of the Work to ensure that materials and workmanship comply with the requirements of this specification.

.2 The Contractor shall develop and submit in writing to the Departmental Representative a Quality Control Inspection Program (QCIP) that addresses all the elements that affect the quality of the line painting including but not limited to:

.1 Paint Application Rates,

.2 Pavement Surface and Atmospheric Conditions,

.3 Line Widths, Line Lengths and Space Lengths.

.3 The Contractor shall maintain records of QCIP data, complaints from the public, and other details relevant to the Work and shall provide these records to the Departmental Representative daily.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect paint from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Alkyd Traffic Paint and Markings:

.1 To MPI #32, Alkyd traffic marking meeting requirements of ASTM D 4797.

.2 Colour: to ASTM E 1360, yellow & white in accordance with MPI Architectural Painting Specification Manual.

.3 Upon request, Departmental Representative shall supply qualified product list of paints applicable to work. Qualified paints may be used but Departmental

Representative reserves right to perform further tests.

.2 Latex traffic Paint and Markings:

.1 To MPI #97, Latex traffic marking meeting requirements of ASTM D 4797.

.2 Colour: to ASTM E 1360 yellow & white in accordance with MPI Architectural Painting Specification Manual.

.3 Upon request, Departmental Representative shall supply qualified product list of paints applicable to work. Qualified paints may be used but Departmental Representative reserves right to perform further tests.

.3 Thinner: to MPI listed manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings acceptable for product installation in accordance with MPI instructions prior to pavement markings application.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.

.3 Proceed with Work only after unacceptable conditions rectified.

3.2 EQUIPMENT REQUIREMENTS

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

3.3 TRAFFIC CONTROL

.1 In accordance with Section 01 35 00.06 - Special Procedures for Traffic Control.

3.4 APPLICATION

.1 Pavement markings: in accordance with the Contract Drawings, or as directed by Departmental Representative.

.2 Unless otherwise approved by Departmental Representative, apply paint when air temperature minimum 10 degrees C, wind speed maximum 60 km/h and no rain forecast within next 4 hours.

.3 Apply traffic paint evenly at rate of 3 m^2 /L to form minimum 8 mil dry film thickness, in accordance with MPI Architectural Painting Specification Manual "Preparation of Surfaces" and "Application" for "Approved Product" listing.

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

.5 Symbols and letters to dimensions indicated.

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

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

3.5 TOLERANCE

.1 Paint markings: within plus or minus 12 mm of dimensions indicated.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

.3 Waste Management: separate waste materials for reuse and recycling.

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

3.7 PROTECTION

.1 Protect pavement markings until dry.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 92 20 Seeding

.2 Section 31 22 13 Rough Grading

.3 Section 31 14 13 Soil Stripping and Stockpiling

1.2 REFERENCES

.1 Agriculture and Agri-Food Canada

.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment

.1 PN1340-2005, Guidelines for Compost Quality.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Quality control submittals:

.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

Part 2 Products

2.1 TOPSOIL

.1 Use native topsoil stripped and stockpiled, provided it meets specified requirements.

.2 If native topsoil is inadequate in quantity, qualities, or both, use imported topsoil meeting specified requirements for balance of topsoil required.

.1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7% clay, and contain 2to 10% organic matter by weight.

.2 Mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.3 Contain no toxic elements or growth inhibiting materials. Free of roots, rocks, subsoil, debris, large weeds and foreign matter.

.4 Finished surface free from:

.1 Debris and stones over 50 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.5 Consistence: friable when moist.

.6 pH value of minimum 5.4 and maximum 7.0.

2.2 SOIL AMENDMENTS

.1 Supply and apply all soil conditioning amendments at rate determined from topsoil analysis for all imported topsoil at the expense of the Contractor.

2.3 SOURCE QUALITY CONTROL

.1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

.3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

.4 Testing of topsoil shall be carried out by testing laboratory designated by Departmental Representative.

.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.

.1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by the Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50mm diameter and other deleterious materials.

.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

.2 Remove debris which protrudes more than 75mm above surface.

.3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100mm.

.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 Spread topsoil to following minimum depths after settlement.

.1 150 mm for seeded areas.

.2 600 mm for shrub beds.

.4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.4 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 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.

.1 Leave surfaces smooth, uniform and firm against deep foot printing.

3.5 ACCEPTANCE

.1 Departmental Representative shall inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.6 SURPLUS MATERIAL

.1 Dispose of materials not required off site.

3.7 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 91 19.13 – Topsoil Placement and Grading

.2 Section 31 22 13 - Rough Grading

1.2 SUBMITTALS FOR INFORMATION

.1 Product Data:

.1 Seed.

.2 Submit copy of purchase order and invoice/receipt from seed supplier indicating all seeds, quantity and lots acquired and all original seed package labels, **including Latin/botanical name of each species**. Submit at completion of seeding, when requested by the Departmental Representative, to confirm total quantity of seed purchased and used on project. Contractor shall ensure all original seed labels are preserved and maintained during seeding operations

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Landscape Contractor: to be a Member in Good Standing of Landscape Alberta Nursery Trades Association.

.2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.

1.4 DELIVERY, STORAGE, AND PROTECTION

.1 Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

Part 2 Products

2.1 SEED MIXTURE

.1 Suppliers:

.1 Supplier as approved by the Departmental Representative.

.2 Qualifications

.1 Supplier shall provide see certificates for review by the Departmental Representative

.3 Substitutions:

.1 As approved by the Departmental Representative.

.4 Seed Mixture:

.1 Sow seeds uniformly at rate of 45kg / hectare.

.2

% By Weight	Common Name	Species Name
45	Alpine Blue Grass	Elymus Poa alpina
45	Spike Trisetum	Trisetum spicatum
10	Awned Wheatgrass	Agropyron trachycaulus var. subsecundus

2.2 SOIL MATERIALS

.1 Topsoil: As specified in 32 91 19.13 – Topsoil Placement and Grading

Part 3 Execution

3.1 EXAMINATION

.1 Verify that prepared soil base is ready to receive the work of this section.

.2 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.

.3 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

3.2 PREPARATION OF SUBSOIL

.1 Per Section – 312213 Rough Grading

.2 Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

.3 Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

.4 Scarify subsoil to a depth of 75 mm where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.3 PLACING TOPSOIL

.1 Per section – 329119.13 Topsoil Placement and Finish Grading

.2 Spread topsoil to a minimum depth of 150 mm over area to be seeded. Rake until smooth.

.3 Place topsoil during dry weather and on dry unfrozen subgrade.

.4 Remove vegetable matter and foreign non-organic material from topsoil while spreading.

.5 Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

.6 Install edging at periphery of seeded areas in straight lines to consistent depth.

.7 Coordinate with installation of underground sprinkler system piping and watering heads.

3.4 BROADCAST SEEDING

.1 No seeding shall be done on frozen soil or when conditions are not favourable for successful seed germination.

.1 Seeding shall be laid down before November 1 2019 or else wait until Spring 2020 to lay seed.

.2 No seeding shall be laid down between November 1 2019 and Spring 2020.

.2 Optimal seeding periods for native grasses are:

.1 Mid to late May, early June – no later than June 30.

.2 Late September – after first hard frost, when plants go dormant.

.3 Apply seed at a rate as indicated in 2.2 of this section during calm weather and when soil moisture content is adequate for germination. Do not sow immediately following rain, when ground is too dry, or during windy periods.

.4 Sow seed in two directions, 50% of seed in one direction and remaining 50% of seed at right angles to first seeding pattern.

.5 Cover broadcasted seed by raking and chain harrowing followed by rolling with roller not exceeding 50 kg.

.6 All equipment shall be stopped during rainfall events of more than 1mm. Work may resume once the surface of the soil has dried off. This is to prevent seed and dirt from sticking to the equipment during the seeding process.

3.5 RESEEDING DURING ESTABLISHMENT PERIOD

.1 After germination of seed, repair and reseed dead or bare spots to allow establishment.

.2 In spring of the following growing season after application, repair and reseed dead or bare spots to allow establishment.

.3 Continue to repair and reseed dead or bare spots until Final Acceptance.

3.6 SEED PROTECTION

.1 Identify seeded areas with stakes, string, and warning signs around area periphery.

.2 Cover seeded slopes where grade is 1:3 or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.

.3 Lay fabric smoothly on surface, bury top end of each section in 150 mm deep excavated topsoil trench. Provide 300 mm overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.

.4 Secure outside edges and overlaps at 900 mm intervals with stakes.

.5 Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

.6 At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 150 mm.

3.7 MAINTENANCE

.1 Manually water as required to ensure healthy and vigorous growth.

.2 Mow grass at regular intervals to maintain at a maximum height of 65 mm. Do not cut more than 1/3 of grass blade at any one mowing.

.3 Neatly trim edges and hand clip where necessary.

.4 Immediately remove clippings after mowing and trimming.

.5 Water to prevent grass and soil from drying out.

.6 Roll surface to remove minor depressions or irregularities.

.7 Mow or weed eat re-seeded areas as required to eliminate weeds and invasive species.

.8 Immediately reseed areas which show bare spots.

.9 Protect seeded areas with warning signs.

.10 Maintenance logs during construction and warranty period shall be submitted at construction completion and monthly throughout the warranty period.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 14 13 Soil Stripping and Stockpiling

.2 Section 32 91 19.13 Topsoil Placement and Finish Grading

.3 Section 32 92 19.13 Mechanical Seeding

1.2 DESCRIPTION

.1 This section specifies requirements for planting trees, planting shrubs and placing rock mulch as indicated on the Contract Drawings.

1.3 MEASUREMENT FOR PAYMENT

.1 All units of measurement for payment shall be as specified in Section 01 27 00 – Measurement and Payment and as shown in the Bid and Acceptance Form.

1.4 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada:

.1 Plant Hardiness Zones in Canada, 2000.

.2 Alberta Conservation Information Management System List of Elements in Alberta - Vascular Plants.

.1 Found online at www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data

.3 Canadian Nursery Landscape Association (CNLA):

.1 Canadian Standards for Nursery Stock, 2006.

.4 Vegetation Removal and Restoration/Reclamation Guidelines. Banff National Park. Parks Canada.

.5 Woody/Vegetative Debris Management Guidelines. 2017. Parks Canada.

1.5 DEFINITIONS

.1 Topsoil: The top layer of soil containing organic material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.

1.6 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling: obtain approval from Departmental Representative of schedule 7 days in advance of shipment of plant material.

.2 Schedule to include:

.1 Quantity and type of plant material.

.2 Shipping dates.

.3 Arrival dates on site.

.4 Planting Dates.

1.7 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for trees, shrubs, ground cover, fertilizer, and mulch and include product characteristics, performance criteria, physical size, finish and limitations.

1.8 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).

1.9 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.

.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 or leaders shall not be accepted.

.4 Storage and Handling Requirements:

.1 Immediately store and protect plant material which shall not be installed within 24 hours in accordance with supplier's written recommendations and after arrival at site in storage location approved by Departmental Representative.

.2 Protect stored plant material from frost, wind and sun and as follows:

.1 For pots and containers, maintain moisture level in containers.

.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 all palettes, crates, padding and packaging materials.

.2 Dispose / recycle materials at appropriate facilities.

1.10 WARRANTY

.1 Contractor hereby warrants that plant materials as itemized on the plant list shall remain free of defects, but for one (1) full growing season following the year of installation.

.2 End of warranty inspection shall be conducted by Departmental Representative.

.3 Departmental 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.

.4 Non-native vegetation shall be removed by the Contractor during the warranty period. Weeds shall be hand-pulled twice in July and twice in August. Weeds shall include any species listed as exotic on the Alberta Conservation Information Management System (ACIMS). When removing weeds, care shall be taken to ensure all parts of the plant including roots are removed. Responsible personnel shall have knowledge and expertise to identify plant species.

1.11 SUBSTITUTION

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

1.12 RESTORATION AREAS

.1 Areas to be restored as shown on drawings.

.2 Refer to 32 92 19.13 Mechanical Seeding for requirements for seeding.

.3 The Contractor must receive approval from the Department Representative before expanding any disturbed area beyond the areas shown on the drawings.

.4 If the Contractor is required to disturb areas beyond the areas shown on the drawing, the Contractor is responsible for restoring this additional area at no additional cost.

Part 2 Products

2.1 TREE AND SHRUB PLANTING

.1 Plant trees and shrubs as shown on the Contract Drawings.

2.2 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 shall be installed. No cultivars are permitted.

.2 Trees and shrubs shall have genetic origin from locations within 400 km of the project site and from Plant Hardiness Zone 2, 3, or 4. To the extent possible, the origin of plant material shall be of similar or lower elevation and latitude.

.2 Plant material: plants from nursery and/or salvaged, 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 Shrubs shall have natural form typical of the species with a minimum of four canes.

.4 Transplanting of any plant material will comply to Canadian Standards for Nursery Stock. Any required replacement of vegetation will be at no additional cost.

2.3 TOPSOIL

.1 Per section 32 91 19.13 Topsoil Placement and Finish Grading.

.2 Topsoil shall be replaced where stripping occurred immediately following final grading of subsoil.

.3 Soils shall be left rough and loose to provide an irregular and undulating surface.

.4 Following topsoil replacement, vehicle and equipment traffic shall be prohibited to prevent soil compaction.

2.4 WATER

.1 Free of impurities that would inhibit plant growth.

.2 Contractor to supply all related hoses, trucks, sprinklers as required at no additional cost.

2.5 MULCH

.1 50mm Rundle Rock Mulch

2.6 FERTILIZER

.1 Fertilizer shall not be used.

2.7 AMENDMENT

.1 Synthetic commercial type as recommended by soil test report.

.1 Ensure new root growth is in contact with mycorrhiza.

.2 Use mycorrhiza as recommended by manufacturer's written recommendations.

2.8 ANTI-DESICCANT

.1 Wax-like emulsion.

2.9 FLAGGING TAPE

.1 Fluorescent, orange colour.

2.10 SOURCE QUALITY CONTROL

.1 Obtain approval from Departmental Representative of plant material prior to planting. Previous approval of plant material shall not impair the right of Departmental 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 licenses. Conform to Federal, Provincial or Territorial regulations.

Part 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 by mid September to allow for root establishment and energy storage prior to winter.

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 Departmental Representative.

.2 Inform Departmental 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 Departmental 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 Locate and protect utility lines.

.5 Notify and acquire written acknowledgment from utility authorities before beginning excavation of planting pits for trees and shrubs.

.6 Planting areas shall be free of weeds prior to excavation and preparation for planting.

3.4 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 Establishment of sub-grade for planting beds in accordance with Section 31 22 13 - Rough Grading.

.2 Preparation of planting beds in accordance with Section 32 91 19.13 - Topsoil Placement and Finish Grading.

.3 Stake out location and obtain approval from Departmental Representative prior to excavating.

3.5 PLANTING

.1 For bare root stock, place 50 mm 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.

.3 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.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 and shrubs:

.1 Backfill soil in 150 mm lifts.

.1 Tamp each lift to eliminate air pockets.

.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.

.3 After water has penetrated into soil, backfill to finish grade.

.2 Form watering saucer as indicated.

.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.

.10 Install and maintain fence around tree and shrub planting areas during the 1 year establishment period to prevent damage by herbivory.

3.6 MULCHING

.1 Ensure soil settlement has been corrected prior to mulching.

.2 Spread mulch as indicated.

3.7 CONSTRUCTUION AND WARRANTY PERIOD MAINTENACE

.1 Conduct maintenance of trees, shrubs and groundcovers as required. Maintenance activities include watering, hand pulling weeds, and replacement of any staking or fencing installed to protect plants.

.2 Contractor shall control weeds during the warranty period as described in Section 1.11.

.3 Perform following maintenance operations from time of planting to end of warranty period and acceptance by Departmental Representative.

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.2 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.3 Remove weeds during summer/fall periods.

.4 Replace or respread damaged, missing or disturbed mulch.

.5 For non-mulched areas, cultivate as required to keep top layer of soil friable.

.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

.7 Remove dead or broken branches from plant material.

.8 Replace or respread damaged, missing or disturbed mulch.

.9 Reform damaged watering saucers.

.10 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

.11 Keep trunk protection and tree supports in proper repair and adjustment.

.12 Remove trunk protection, tree supports and level watering saucers at end of warranty period.

.13 Remove and replace dead plants and plants not in healthy growing condition.

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

.15 Submit monthly written reports to Departmental Representative identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required.

3.8 ACCEPTANCE

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

3.9 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 02 41 13 Selective Site Demolition

1.2 MEASUREMENT PROCEDURES

.1 Included as part of work in Section 02 41 13 Selective Site Demolition

1.3 REFERENCES

.1 American National Standard Institute (ANSI)

- .1 ANSI A300 (Part 1)-2001, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (revision and re-designation of ANSI A300-1995) (includes supplements).
- .2 ANSI A300 (Part 2)-1998, Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices - Part 2 - Fertilization.
- .3 ANSI A300 (Part 3)- 2000, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance: Standard Practices - Part 3 - Tree Support Systems (a. Cabling, Bracing, and Guying) (supplement to ANSI A300-1995).

.2 Canadian Nursery Landscape Association (CNLA)

.3 International Society of Arboriculture (ISA)

.4 Ontario Ministry of Agriculture, Food and Rural Affairs

- .1 Publication 483-2004, Pruning Ornamentals.

1.4 DEFINITIONS

.1 Crown Cleaning: consists of selective removal of one or more of following items: dead, dying or diseased branches, weak branches and water sprouts.

.2 Crown Thinning: consists of selective removal of branches to increase light penetration, air movement and reduce weight.

.3 Crown Raising: consists of removal of lower tree branches to provide clearance.

.4 Crown Reduction or Crown Shaping: decreases tree height and/or spread.

.5 Vista Pruning: is selective thinning of framework limbs or specific crown areas to improve views.

.6 Crown Restoration: improves structure, form and appearance of trees that have been severely headed or vandalized.

1.5 QUALITY ASSURANCE

.1 Certification: provide International Society of Arboriculture or Canadian Nursery Landscape Association certification.

.2 Field Samples: do sample pruning in manner to enable Departmental Representative to identify:

.1 Knowledge of target areas including branch bark ridge and branch collars.

.2 Technique for selection process and pruning used to establish desired form and shape for each species.

.3 Acceptance of Work shall be determined by Departmental Representative from field sample.

.4 Health and Safety Requirements: 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 Place materials defined as hazardous or toxic in designated containers.

.2 Dispose of unused disinfectant at official hazardous material collections site approved by Departmental Representative.

.3 Ensure emptied containers are sealed and stored safely.

.4 Divert wood materials from landfill to composting as directed by Departmental Representative.

1.7 TOOL MAINTENANCE

.1 Ensure that tools are clean and sharp throughout pruning operation: do not use tools that crush or tear bark.

.2 Disinfect tools before each tree is pruned.

.3 On diseased plant material disinfect tools before each cut.

Part 2 Products

2.1 DISINFECTANT

.1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

Part 3 Execution

3.1 APPLICATION

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

3.2 GENERAL

.1 Prune in accordance with ANSI A300, and as directed by Departmental Representative. Where discrepancies occur between standard and specifications, specifications govern.

.2 Notify immediately Departmental Representative conditions detrimental to health of plant material or operations.

.3 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10 degrees C.

.4 Retain natural form and shape of plant species.

.5 Do not:

.1 Flush cut branches.

.2 Crush or tear bark.

.3 Cut behind branch bark ridge.

.4 Damage branch collars.

.5 Damage branches to remain.

3.3 PRUNING

.1 Around perimeter of project limit of work, existing trees shall be pruned to remove dead, dying, diseased and weak growth from plant material to provide crown raising for clearance of vehicles and pedestrians, or as directed by Departmental Representative, in order to promote healthy growth.

.2 Remove live branches that:

.1 Interfere with healthy development and structural strength including branches crossed or rubbing more important branches.

.2 Are of weak structure including narrow crotches.

.3 Obstruct development of more important branches.

.4 Are broken.

.3 Remove live branches to re-establish natural species form including:

.1 One or more developing leaders.

.2 Multiple growth due to previous topping.

.3 Branches extending outward from natural form.

.4 Undesirable sucker growth.

.4 Remove loose branches, twigs and other debris lodged in tree.

.5 Remove vines.

.6 For branches under 50 mm in diameter:

.1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at angle equal to that formed by line opposite to branch bark ridge.

.2 Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.

.3 Do not cut lead branches unless directed by Departmental Representative.

.7 For branches greater than 50 mm in diameter:

.1 Make first cut on lower side of branch 300 mm from trunk, one third diameter of branch.

.2 Make second cut on upper side of branch 500 mm from trunk until branch falls off.

.3 Make final cut adjacent to and outside branch collar.

.8 Ensure that trunk bark and branch collar are not damaged or torn during limb removal.

.1 Repair areas which are damaged, or remove damaged area back to next branch collar.

.9 Remove additional growth designated by Departmental Representative.

3.4 ROOT GIRDLING

.1 For girdling roots one-quarter size of trunk diameter or larger, V-cut girdling root one-halfway through at point where root is crossing.

.2 Remove exposed portion of girdling root as directed by Departmental Representative after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

3.5 CARE OF WOUNDS

.1 Shape bark around wound to oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.

3.6 CLEAN-UP

.1 Proceed in accordance with Section 01 74 00 - Cleaning.

.2 Collect and compost/recycle whenever applicable pruned material and remove from site.

.3 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 PAVEMENT REPAIR PROCEDURES

.1 The Work consists of spreading and compacting asphalt bound aggregate mix (i.e. asphalt concrete pavement) by means of machine or hand on a prepared pavement surface or in a shallow excavating to the lines and dimensions; The Contractor shall, in consultation with the Department Representative, pre-mark the areas requiring pavement repairs prior to commencing the Work. This work shall be carried out between the entrance of Highway 93 (Icefields Parkway) to Peyto lake upper parking lot (approximate length is 1.1km).

.2 Loose debris or other excess material shall be removed from the areas from the existing pavement surface to be patched, by brooming or other methods, and a prime or tack coat applied. The Contractor shall remove and dispose of any failed Asphalt Concrete pavement in the area to be patched as directed by the Departmental Representative.

.3 The tack coat shall extend a sufficient distance beyond the edge of the repair area to allow for a smooth transition of patching material to the existing pavement surface.

.4 Asphalt concrete pavement on the edges of a patch shall be “feathered” using rakes or lutes. Coarse material shall be removed from the patch edges.

Asphalt concrete pavement shall be spread in uncompacted lifts not exceeding 100mm in depth and compacted to produce a hard, stable surface which does not rut or otherwise distort under traffic loading.

Asphalt concrete pavement shall be placed in a depression shall be compacted such that the completed patch is approximately 15mm higher or match the surrounding existing pavement, but with the material on the edges “feathered” to provide a smooth transition between the patch and the existing pavement surface.

Asphalt concrete placed in a patch that is in a rutted depression parallel to the wheel paths, shall be compacted such that the completed patch is level with the adjacent undisturbed pavement. In addition, the material on the edges of the patch shall be feathered to provide a smooth transition between the patch and the existing pavement surface.

.5 The Contractor shall raise any concerns with quantity control of any asphalt concrete pavement thickness with the Departmental Representative prior to commencement. Failure to raise any issues prior to commencement may result in payment quantity reductions being applied to the Work.

.6 During asphalt repair or paving operations, the Contractor may have to hand-place in narrow sections / slivers where standard pavers will not fit. The Contractor shall allow for instances of hand-work within their unit rates. No separate or additional payment will be made to the Contractor for hand-place asphalt, whether directed by the Departmental Representative, or arising from the Contractor’s selected staging and construction methodology.

1.2 MEASUREMENT AND PAYMENT

.1 Payment will be at the applicable unit price bid per square metre (Asphalt Pavement - Surface Patching).

Payments for this item shall be compensated in full for preparing the surface, supplying, and applying the prime or tack coat, picking up, placing, and compacting the asphalt concrete patching material, and all labour, equipment, tools, and incidentals necessary to complete the Work.

.2 Payment for Rough Grading (section 31 22 13), Roadway Subgrade Reshaping (section 31 22 13.13), and Excavation, Trenching and Backfilling (section 31 23 33.01) will be made under bid line item “Common Excavation”.

Regardless of construction method used by the Contractor to haul Common Excavation or dispose excess material. Overhaul of Common Excavation or disposing of excess material will considered incidental to the Work.

END OF SECTION

Appendix 1 - Basic Impact Analysis

Prepared for:

Parks Canada Agency
Banff National Park, Alberta

June 2019
CT184101

Basic Impact Assessment

Peyto Lake Day Use Area Rehabilitation
Peyto Lake, Banff National Park, Alberta

Prepared for:

Parks Canada Agency
Banff National Park, Alberta

June 2019
CT184101

Prepared for:
Parks Canada Agency
Banff National Park, Alberta

Prepared by:
Wood Environment & Infrastructure Solutions
401, 1925 – 18 Avenue NE
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Third-party disclaimer

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26 June 2019
CT184101

Katelyn Shaw, Project Manager
Project Delivery Services West - Strategic Policy and Investment Directorate
Parks Canada / Government of Canada
100 Mountain Avenue
PO Box 900
Banff, AB T1L 1K2

Dear Ms. Shaw:

Re: Basic Impact Assessment, Peyto Lake Day Use Area Rehabilitation

Please find enclosed a copy of the Basic Impact Assessment for the proposed works associated with the Peyto Lake Day Use Area Rehabilitation Project

Yours truly,

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

Ian J Campbell, B.Sc., P.Biol.
Senior Environmental Scientist

IJC/jm
c: Jena Kurtenbach

Table of Contents

Table of Contents (cont'd)

List of Figures

List of Tables

List of Appendices

1.0 INTRODUCTION

Wood Environment & Infrastructure Solutions (Wood), a Division of Wood Canada Limited, was retained by Parks Canada Agency (PCA) to conduct a Basic Impact Assessment (BIA) for the rehabilitation of the day use area at Peyto Lake located in Banff National Park. The purpose of the BIA was to provide an assessment of the environmental impacts associated with the rehabilitation and expansion of the asphalt pavement structures at the public parking lots, expansion of the viewpoint structures and realignment of the access trail(s) from the parking lots to the viewpoint. This report summarizes the results of the field investigation and provides mitigation measures to reduce environmental impacts.

1.1 Project Description

Peyto Lake is a day use visitor attraction located about 44 km north of Lake Louise, Alberta, on Highway 93 (Figure 1). There are two parking lots at the lake. The lower parking lot located off the site access road approximately 480 m west of Highway 93 is used for light vehicles. The upper parking lot located at the end of the site access road, approximately 1.1 km west of Highway 93, is used for both light vehicles and passenger buses.

The Project consists of three priority areas:

- Priority 1 – Lower Parking Lot;
- Priority 2 – Upper Parking Lot; and
- Priority 3 – Pathways & Viewpoint Structure Improvements.

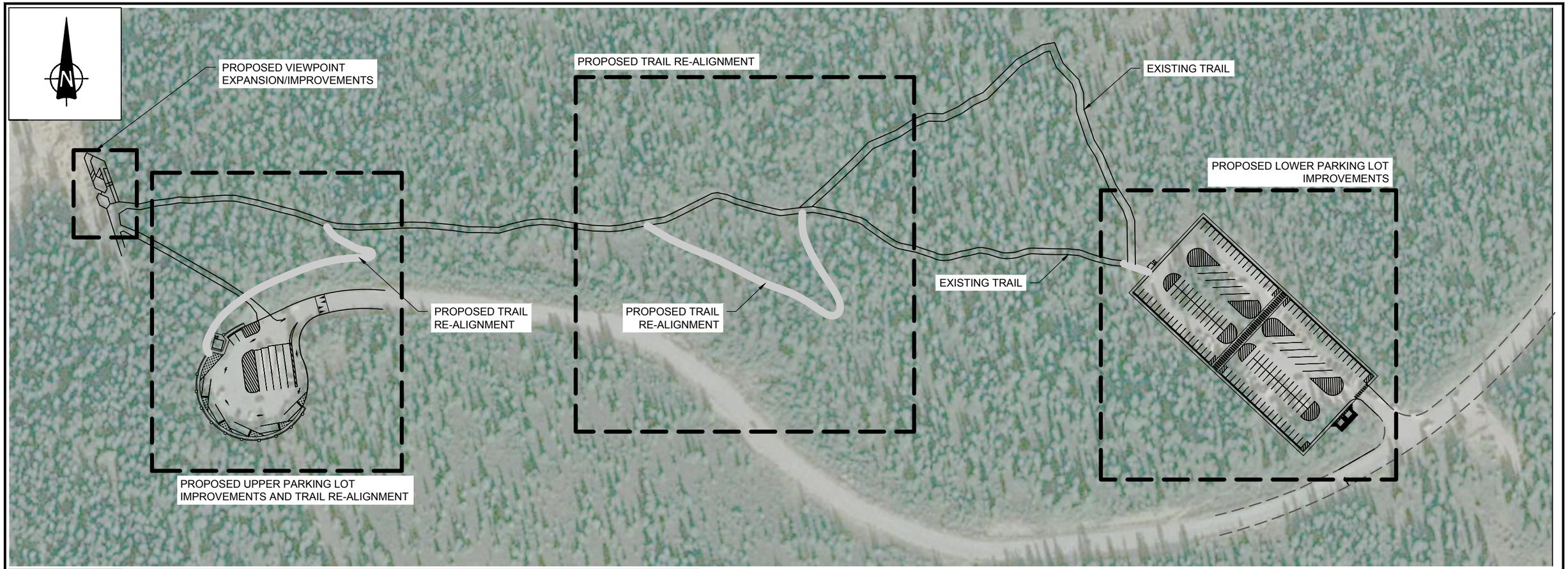
1.1.1 Priority 1 – Lower Parking Lot

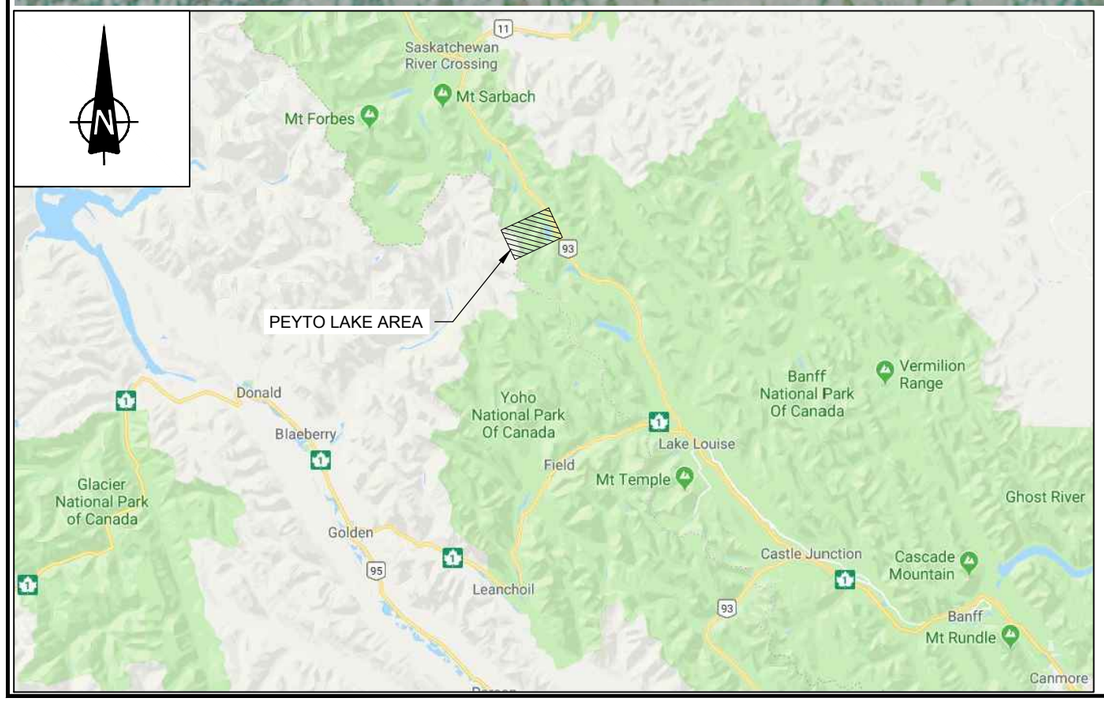
The lower parking lot covers an area of about 5,500 m^2 with an island of sub-alpine fir forest located in the centre of the parking lot. There is a self-contained, two-stall public washroom at the southeast corner of the parking lot. The parking lot is surrounded by sub-alpine fir forest starting about 1 to 5 m from the edge of the existing pavement.

Construction at the lower parking lot will include removal and replacement of the existing asphalt pavement and expansion of the current parking lot (increase in footprint of 2,280 m^2). Trees will be removed to accommodate the expansion including the existing forest island in the centre of the lot plus reconfiguration to a rectangular lot shape. The existing sidewalks, curb and fencing around the lot will be removed. The existing two-stall washroom building will be replaced with four (4) washroom stalls in one or two buildings, as appropriate which will be located at the south end of the lot, adjacent to the entrance. Garbage cans will be provided near the washrooms. Improved signage will direct visitors to the pathway leading to the viewpoint structure.

1.1.2 Priority 2 – Upper Parking Lot

The upper parking lot covers an area of about 1,900 m^2. The upper lot is bordered by a wooden fence. The forest cover begins about 1 to 5 m from the edge of the pavement.





wood.	PROJECT NAME: BANFF NATIONAL PARK PEYTO LAKE DAY USE AREA REHABILITATION (FII 1494)		PROJECT NUMBER: CT184101
CLIENT: PARKS CANADA AGENCY	SHEET TITLE: FIGURE 1		FIGURE NUMBER: FIG - 01
			ISSUE/REVISION: A

Construction at the upper parking lot will include minor expansion (increased footprint of 850 m^2; or an approximate increase of 5.5 m around the entire perimeter of the lot) and placement of an asphalt overlay on the current asphalt surface. A self-contained washroom will be installed at the north end of the parking lot, adjacent to the trailhead. Improved signage will direct visitors, particularly those requiring the accessible pathway, to the main pathway leading to the viewpoint structure.

1.1.3 Priority 3 – Pathways & Viewpoint Structure Improvements

There are three options for pathway improvements and/or realignments. All three options were considered in this BIA. Changes to the pathways will improve access for visitors including children, strollers and visitors who are able to walk but with reduced mobility. Existing pathway widths vary. For example, from the lower lot, the path width in the vicinity of the steepest slope is wider than that at the top near the viewpoint structure. The existing widths are acceptable to PCA and will be maintained. Pathway improvements will include tree removal in areas where shading results in icy conditions or unclear pathway routes. Pathway design options consider complete realignment of the existing pathway (i.e., switch backs) in steep sections to improve grades. Methods to deter people from short-cutting or proceeding off the pathway may be required (i.e., plantings, boulders, uneven walking surfaces such as cobble).

Any portion of the existing pathway that will not be used will need to be rehabilitated, beginning with removal of existing hard surfaces. The ground will be re-contoured to fit in with the surrounding terrain and topsoil placed prior to seeding or planting. Decompaction of the upper layers may be required.

To increase visitor capacity, improve visitor safety and improve visitor experience, the existing viewpoint structure will be expanded. There are two options. The first includes minimal upgrades consisting of accessibility improvements to the second deck for disabled visitors and replacement of the guardrail. The second option is an expansion of the viewpoint, including preservation of the existing decks, addition of one deck and installation of a ramp improving accessibility to all but one deck for disabled visitors.

2.0 METHODS

This BIA was conducted in accordance with the template for BIAs as provided by PCA. In addition to a desktop study, a reconnaissance-level vegetation and wildlife field assessment was undertaken on 11 April 2019 to determine whether critical habitat for vegetation and wildlife is present at the site and identify the potential for impacts associated with construction. The BIA identifies any BMPs that may be applied as part of the analysis, describes biophysical conditions in the vicinity of the Project, predicts potential impacts and identifies any mitigation measures to be implemented. No species-specific wildlife surveys are included as part of this assessment.

To maintain the Project schedule, the reconnaissance survey for vegetation and wildlife occurred during early spring (11 April 2019) when there was about 1 m of snow cover.

2.1 Study Area

The Project study area is defined as the physical project footprint plus a 10 m buffer.

2.2 Regulatory Framework

Wildlife and wildlife habitat were assessed with reference to the following legislation: the *Species at Risk Act* (SARA 2002), *Canada National Parks Act, 2000* and the *Migratory Birds Convention Act, 1994*.

The purposes of the *Species at Risk Act* are to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species that are extirpated, endangered, or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened. Under the SARA, it is an offence to kill, harm, harass, capture, or take an individual of a species listed in Schedule 1 of SARA; to possess, collect, buy, sell or trade an individual of a species listed in Schedule 1 of SARA; or to damage or destroy the residence (e.g., nest or den) of one or more individuals of a species listed in Schedule 1 of SARA, or as an extirpated species if a recovery strategy has recommended the reintroduction of the extirpated species into the wild in Canada.

The definition of *SARA* Schedule 1 is as follows:

- *Schedule 1* – Official list of protected wildlife Species At Risk in Canada; classified as extirpated, endangered, threatened, or a special concern. Classification coincides with Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designations. Once listed, measures to protect and recover the species are implemented (SARA 2002).

When a listed species is found within a national park or other lands administered by the PCA, that species is protected or managed under the *Canada National Parks Act*. There are also other measures for protection or management tools available to the PCA under other legislation (MOE 2010, COSEWIC 2010).

The *Migratory Bird Convention Act* (MBCA) serves to protect migratory birds under Section 12.1(h) which prohibits the killing, capturing, injuring, taking or disturbing of migratory birds or the damaging, destroying, removing or disturbing of nests. Section 6(a) of the Migratory Birds Regulations prohibits the disturbance, destruction or taking of a nest, egg, or nest shelter of a migratory bird species listed under the MBCA.

Vascular plant species and habitat were assessed with reference to the *Species at Risk Act* (SARA 2002).

2.3 Valued Components Selection

Valued Components (VC) were selected based on existing information for known species distributions and historical detections in the area, and listed species (i.e., species listed under SARA (2002), or the COSEWIC (GC 2019)) or other federal legislation (*Migratory Bird Convention Act*). A discussion was held with PCA about VC selection (Higgins pers. comm. 2019).

One plant species, three wildlife species and one species community (Table 2-1) were selected as VCs to discuss potential Project effects. Potential impacts to these VCs are discussed below.

Table 2-1: Species Selected as VCs and Selection Rationale

Species	Rationale for Selection
Whitebark pine	Listed on Schedule 1 of SARA and as Endangered by COSEWIC (GC 2019).
Woodland caribou (central mountain population)	Project Area falls within Banff Caribou Range. Caribou are listed on Schedule 1 of SARA and as Threatened by COSEWIC (GC 2019), but are Extirpated.
Grizzly Bear	Listed as Special Concern by COSEWIC (GC 2019), Threatened by ESCC (GoA 2016).
Little brown bat	Listed on Schedule 1 of SARA and as Endangered by COSEWIC (GC 2019).
Migratory birds	Protected by the federal *Migratory Bird Convention Act* (1994). Project Area provides valuable nesting habitat for several migratory birds.

2.4 Desktop Review

A synthesis of available biological data, study reports and science literature was undertaken. Data sources for vegetation species and associated habitat included:

- *Natural Regions and Subregions of Alberta* (Natural Regions Committee (NRC) 2006).
- Species assessment and associated response statement for whitebark pine (COSEWIC 2010, MOE 2010); and
- Rec*overy Strategy for the Whitebark Pine (Pinus albicaulis) in Canada [Proposed]* (Environment and Climate Change Canada (ECCC) 2017).

Data sources for wildlife species and associated wildlife habitat included:

- Fish and Wildlife Information Management System (FWMIS) species occurrence data (AEP 2019a). The FWMIS database contains historical data from species survey detections, surveys and studies (e.g., through industry or research driven projects);
- Wildlife Sensitivity Zones (AEP 2019b);
- Data and recommendations from regional initiatives, such as the Alberta Biodiversity Monitoring Institute (ABMI), and Important Bird Areas (IBA) (BLI 2019);
- Relevant regulatory documents, scientific literature, and academic studies; and
- Wildlife Range Maps (Semenchuk 2007; Forsyth 1999; Pattie & Fisher 2003).

3.0 RESULTS

3.1 Vegetation

The expansion and upgrades to the parking lots and associated facilities, alterations and realignment of trails and expansion of the viewpoint will result in the removal of vegetation and may alter critical habitat for Whitebark pine. This section describes the general vegetation resources of the area, the potential impacts of the proposed Project and the best management practices and mitigation measures to reduce impacts. Data gaps are identified.

3.1.1 Desktop Review

The Project lies with the Subalpine Natural Subregion, at high elevations on rolling to inclined shallow morainal and residual materials over bedrock (NRC 2006). Short, cool summers and long, cold winters with heavy snow cover are characteristic (NRC 2006). Vegetation patterns in the Subalpine Natural Subregion are created by interactions between elevation, topography and latitude with highly variable microclimates resulting from broad ranges in aspects, wind exposures, elevations and substrates (NRC 2006). Higher elevations (i.e., the Upper Subalpine zone) are forested by closed Engelmann spruce–subalpine fir forests that open up near the forest line and include subalpine larch and whitebark pine. Stunted individuals and krummholz islands occur near treeline. At lower elevations, closed lodgepole pine forests are dominant (NRC 2006) (NRC 2006). The year-round cold climate results in slow tree growth rates (NRC 2006).

3.1.2 Site Visit

In the Project Area, the overstory vegetation is dominated by Engelmann spruce and sub-alpine fir. Soils in the area are coarse, rocky and shallow, with bedrock at or near surface. There is potential for whitebark pine to be present on the south side of the upper parking lot and adjacent to the viewpoint. A site reconnaissance visit was conducted on 11 April 2019 to gather an overview of vegetation and wildlife habitat potential for the Project. Snow cover was still significant during the site visit, preventing access to the areas outside of the parking lots and off of the established trails. The entire area was forested by a relatively closed stand of Engelmann spruce and sub-alpine fir. Two pine trees were observed at the viewpoint, but confirmation of species was not possible due to site conditions and position on the steep slope. Ground cover, including rare plant and weed/invasive species, was not visible.

A subsequent site visit was conducted on 11 June 2019 by PCA staff to determine whether individual whitebark pine trees or whitebark pine critical habitat is present in the vicinity of the Project area. Within a 50 m vicinity of the parking lot, no whitebark pine trees were found and no forest openings >0.5 ha in size above the minimum elevation threshold with biophysical attributes were found (PCA 2019, Appendix A).

Within a 50 m vicinity of the Peyto Lake viewpoint, 34 whitebark pine trees were recorded (PCA 2019). The closest whitebark pine tree is ~10 m from the existing viewpoint. The habitat survey concluded that it is not likely that the Project area will impact the rooting zones of any existing whitebark pine trees. Potential whitebark pine critical habitat (forest openings with well-to rapidly-drained soils) is found within the Peyto Lake viewpoint Project area and makes up approximately one third of the proposed expanded viewpoint. To define it as critical habitat a more exhaustive survey throughout this “Known Range” polygon would need to be carried out to determine whether this polygon contains a high density of whitebark pine (PCA 2019).

3.1.3 Whitebark Pine

Whitebark pine is an Endangered species in Canada and is listed as such on Schedule 1 of SARA, with approximately 56% of its entire range lying in Canada (ECCC 2017). This species occurs almost entirely on federal and provincial Crown lands. Populations exist in national parks in both Alberta and British Columbia (i.e., Banff, Jasper, Kootenay, Mt Revelstoke-Glacier, Waterton Lakes, Yoho). The habitat for this species is protected within national parks by the *Canada National Parks Act*, and by management plans and processes for maintaining or restoring ecological integrity within national parks. Managers of national parks in Alberta and British Columbia are aware of the need to protect whitebark pine habitat and have taken measures to do so (COSEWIC 2010).

This hardy species endures challenging climatic conditions in the high elevation, upper subalpine habitats with temperatures ranging from below - 40°C in the winter to summer temperatures reaching 30°C (COSEWIC 2010, ECCC 2017). Whitepark pine is threatened by white pine blister rust, mountain pine beetle, climate change and fire suppression, putting this species at high risk for extirpation from Canada (COSEWIC 2010, ECCC 2017). In addition to these threats, whitebark pine is a slow growing, late maturing species that is obligately dependent on Clark's Nutcracker (*Nucifraga columbiana*) for seed dispersal and subsequent regeneration (COSEWIC 2010, ECCC 2017). Other challenges with regeneration include summer soil temperatures nearing 60°C at the soil surface, resulting in seedling mortality (COSEWIC 2010, ECCC 2017). Cone production generally begins at about 30-50 years of age with sizable crops starting at about 60-80 years of age (COSEWIC 2010). Cone production is greatest at about 250 years of age and may continue well past this age. It takes about 3 years for seeds to germinate after dispersal. Seeds that are dispersed but not consumed by wildlife may exhibit delayed germination, resulting in the formation of a seedbank.

3.2 During the June 2019 Wildlife

The construction of the upgraded parking lot and associated facilities, new trails, and new viewpoint may alter wildlife habitat and habitat effectiveness, as well as alter wildlife movement, and increase wildlife mortality in the area. This section describes the key wildlife and habitat resources of the area. Data gaps are also identified.

3.2.1 Desktop Review

The Project infrastructure is situated within the Sub-alpine Natural Subregion of the Rocky Mountain Natural Region (NRC 2006). The Study Area contains a mostly uniform coniferous habitat, which can support a variety of wildlife species. Suitable habitat exists for grouse, migratory songbirds and owls, as well as mammals such as grizzly and black bears, deer, bighorn sheep, mustelids (e.g., weasels), Canada lynx, wolves, and small mammals (snowshoe hare, squirrels, chipmunks, mice, voles and allies).

A list of all wildlife species of concern known or with the potential to breed within the Study Area was developed using regional and provincial references (e.g., ABMI 2019; eBird 2019; Eder and Kennedy 2011; Fisher et al. 2007; Semenchuk 2007) and is provided in Table 3-1. Status of the listed species is based on regulatory status as designated by the Alberta Endangered Species Conservation Committee (ESCC), COSEWIC, and SARA and corresponding Schedules. Definitions for these designations are provided in Table 3-2.

Table 3-1: Wildlife Species At Risk with the Potential to Breed in the Study Area

Common Name	Scientific Name	SARA (GC 2019)	COSEWIC (GC 2019)	ESCC (GoA 2016)
Birds				
Raptors & Owls				
Barred owl	*Strix varia*	-	-	Special Concern
Nightjars				
Common nighthawk	*Chordeiles minor*	Schedule 1	Special Concern	-
Songbirds				
Barn swallow	*Hirundo rustica*	Schedule 1	Threatened	-
Black swift	*Cypseloides niger*	-	Endangered	-
Evening grosbeak	*Coccothraustes vespertinus*	-	Special Concern	-
Olive-sided flycatcher	*Contopus cooperi*	Schedule 1	Special Concern	-
Mammals				
American badger	*Taxidea taxus taxus*	Schedule 1	Special Concern	Data Deficient
Grizzly bear	*Ursus arctos*	Schedule 1	Special Concern	Threatened
Little brown bat	*Myotis lucifugus*	Schedule 1	Endangered	-
Wolverine	*Gulo gulo*	Schedule 1	Special Concern	Data deficient
Woodland caribou	*Rangifer tarandus*	Schedule 1	Threatened (Extirpated)	-

* "-" denotes not listed
Shaded: denotes historical FWMIS detection

Table 3-1: At Risk Definitions (FWD 2010; COSEWIC 2019; SARA 2002)

Alberta Endangered Species Conservation Committee (ESCC[1]) (FWD 2010)

- *Species at Risk* – A species at risk of extinction or extirpation (endangered or threatened), or a species of special concern.
- *Endangered*[2] – A species facing imminent extirpation or extinction.
- *Threatened*[2] – A species likely to become endangered if limiting factors are not reversed.
- *Species of Special Concern* – A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
- *Data Deficient* – A species for which there is insufficient scientific information to support status designation.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and *Species at Risk Act* (SARA) (SARA 2002)

Endangered	A species facing imminent extirpation or extinction.
Threatened	A species likely to become endangered if limiting factors are not reversed.
Special Concern	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk	A species that has been evaluated and found to be not at risk.
Data Deficient	A species for which there is insufficient scientific information to support status designation.
SARA Schedule 1	Official list of wildlife species at risk.
SARA Schedule 2	Species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
SARA Schedule 3	Species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1

[1] Based on COSEWIC definitions
[2] Endangered and threatened definitions are legal designation under the AB *Wildlife Act*

One designated Wildlife Sensitivity Zone exists within the Study Area:

- Caribou Range- Banff.

The Caribou Range identifies critical habitat for caribou in order to reduce human caused mortality, as per the *Master Schedule of Standards and Conditions* (GoA 2018), and the *Recovery Strategy for the Woodland Caribou, Southern Mountain Population* (Environment Canada 2014). Peyto Lake falls within the Banff Caribou Range (AEP 2019b), even though the central mountain population in Banff National Park was extirpated in 2009 (GoA 2017; PCA 2017).

There are no Alberta Biodiversity Monitoring Institute (ABMI) survey locations within Banff National Park. Therefore, no data from this database can be presented here.

The Citizen Science eBird database has a hotspot point for Peyto Lake/Bow Summit (eBird 2019). Data go back to 1973 and are current to November 2018. These data show a total of 85 species detected and the only SARA listed species was barn swallow (*Hirundo rustica*) (eBird 2019).

FWMIS results identified two wildlife species of concern within a 2 km buffer: grizzly bear (*Ursus arctos*) (within 1 km), and western toad (*Anaxyrus boreas*) (within 2 km). Both species are designated as Special Concern by COSEWIC and are on SARA Schedule 1 (GC 2019). Western toad is unlikely to breed within the Study Area, as there are no waterbodies present; however, western toads may occur within the Study Area as they are passing through or foraging.

There are no important bird areas as designated by Important Bird Area Canada (IBA Canada nd.) or Bird Life International (BLI 2019).

3.2.2 Site Visit

A site reconnaissance was conducted on 11 April 2019. Site conditions consisted of approximately 1 m of snow cover, while the temperature was approximately 3°C, and it was partially sunny with very light winds. It was evident that a fresh snowfall had occurred in the past 24 hours.

Due to the early spring conditions, only four wildlife species or their signs were observed during the site visit (Table 3-3). Tracks of either fisher (*Martes pennanti*) or American marten (*Martes americana*) were noted on the trail system near the upper parking lot. Fisher tracks cannot always be confirmed due to size-overlap with marten (Halfpenny et al. 1995). Snowshoe hare tracks were also noted in several locations throughout the trail system. Neither of the four species are federally listed species. In addition, a notice was posted for an area closure due to a grizzly bear hibernating between Peyto Lake and Bow Lake.

Table 3-3: Wildlife Species or Sign Observed on Site Visit

Common Name	Scientific Name	GOA 2017	ESCC 2016	COSEWIC (GC 2019)	SARA (GC 2019)
Common raven	*Corvus corax*	Secure	-	-	-
Clark's nutcracker	*Nucifraga columbiana*	Secure	-	-	-
Snowshoe hare	*Lepus americanus*	Secure	-	-	-
American marten/fisher	*Martes americana/Martes pennanti*	n/a	-	-	-

Despite the low wildlife presence during the Site visit due to the early spring timing, a number of wildlife species occur in this area and effects of the Project would vary by species depending on habitat use and relative abundance within and near the areas proposed for redevelopment. Project details remain at the conceptual level. The following discussion of potential effects is largely qualitative, based on professional judgment supported by the information collected to date.

3.2.3 Woodland Caribou

In Alberta, woodland caribou (*Rangifer trandus caribou*) are listed as Endangered under the Alberta *Wildlife Act* (AWA 2000). Federally, woodland caribou have been designated as Threatened by COSEWIC (GC 2018) and are on Schedule 1 of *SARA*. The southern mountain caribou (central group) has been extirpated from the Banff Range (GoA 2017; PCA 2017). A PCA wildlife biologist has reviewed the Project and confirmed that the Project is in a high elevation core caribou Critical Habitat area. As a result, a SARA Authorization will be required.

Woodland caribou require large tracts of range where they can separate themselves from other prey and predator, and shift their range use in response to various natural processes (e.g. fire, forest insects, weather/snow conditions) and human activities (COSEWIC 2014). Mountain caribou require access to high-quality undisturbed calving areas in high-elevation alpine, subalpine parkland, subalpine forests, or islands in lakes (COSEWIC 2014).

In winter months, mountain caribou forage primarily on terrestrial lichens either in older coniferous forests at low elevations or on windswept alpine slopes, and summer at high elevations in mountains (COSEWIC 2014). They may also forage on arboreal lichens in older, low-elevation and subalpine forests (COSEWIC 2014).

In the R*ecovery Strategy for the Woodland Caribou, Southern Mountain Population* (Environment Canada 2014), critical habitat identification describes the habitat necessary to maintain or recover self-sustaining local populations throughout their distribution. In general, southern mountain caribou occupy annual ranges consisting of highly diverse topography, terrain types, and environmental conditions (Environment Canada 2014).

The primary threats to southern mountain caribou include altered predator-prey dynamics due to both direct and functional habitat loss and disturbance resulting from industrial activities, vehicle collisions, motorized recreation (all terrain vehicle, snowmobiling), facilitated access to caribou winter range for predators resulting from increased linear corridors and packed trails or ploughed roads in winter (COSEWIC 2014). The Project is unlikely to change predator-prey dynamics or increase the wolf populations. There will be no additional linear corridors or new ploughed roads. In addition, motorized recreation will not be allowed at Peyto Lake.

Since the Banff herd has been extirpated (GoA 2017; PCA 2017), it is unlikely that mountain caribou will be impacted by the Project, but it is important to maintain the habitat within the Banff Caribou Range. Old growth forest is a seasonal habitat requirement for this species (PCA 2017). Management of the fire regime will be essential to ensure a suitable range of forest patches of varying stand ages across the landscape over time (PCA 2017).

Project effects to caribou could include some loss of habitat due to clearing of forested areas from the Project footprint. Sensory disturbance such as frequently travelled access roads, construction activities including vegetation clearing, or visitor presence may disturb caribou foraging and calving within close proximity to noisy areas, which may reduce habitat effectiveness.

3.2.4 Grizzly Bear

COSEWIC recommended a conservation status of "Special Concern" for the western population of grizzly bears because the global distribution of this species has declined by >50% since the 1800s and Western Canada represents a significant core of the current North American range (COSEWIC 2012). The species is highly sensitive to high levels of human disturbance and subject to high mortality risk in areas of abundant human activity. There is no federal recovery plan for the western population, nor is the species listed on a *SARA* schedule.

Grizzly bears are habitat generalists and omnivores with habitat preference driven by seasonal variation in primary forage resources, typically reflected by local plant development and prey availability; therefore, in mountainous regions, this results in seasonal elevational migrations (COSEWIC 2012). Influences related to human activities and developments are increasingly taking precedence over biophysical features as determinants of grizzly bear habitat quality and have led to range fragmentation resulting in functional habitat loss throughout much of the species' range (COSEWIC 2012). Linear project footprints are linked to increased grizzly bear mortality in Alberta, with most human-caused grizzly bear mortalities occurring within 500 m of a road or 200 m of a trail (Farr et al. 2017). Grizzly bears are sensitive to increased mortality because of their naturally low reproductive rates.

There is strong evidence of genetic fragmentation of the grizzly bear population in the southern portion of its range where human disturbance from cumulative development has fragmented the landscape resulting in reduced range condition, increased population isolation, and increased demographic stochasticity from small population size (COSEWIC 2012).

Project effects to grizzly bear could include loss of habitat due to clearing of forested habitat from the Project footprint. Sensory disturbance such as frequently travelled access roads, construction activities including vegetation clearing, or visitor presence may reduce grizzly bears foraging and hibernation den selection within close proximity to noisy areas, which may reduce habitat effectiveness. The planned late summer construction period for the Project may impact bear distribution within the area, due to noise and human presence, in addition to increasing the risk of bear-human interaction and, potentially, human-induced grizzly mortalities.

3.2.5 Little Brown Myotis

Little brown myotis are listed as Endangered by COSEWIC (GC 2019) and are in Schedule 1 of the *SARA* due to the threat of white-nose syndrome on hibernating bat species. The little brown bat is the most common bat species in Alberta (ACBP 2018). In remote areas, colonies and roosts are found in large, tall, hollow trees, in the early to middle stages of decay (Jung et. al. 2004). Hibernacula are usually cool, dark, humid places in which the air does not move (e.g., caves, natural cavities or under peeling bark on old trees (COSEWIC 2013, Pattie and Fisher 2003)).

Critical habitat is considered to be any site where little brown myotis has been observed hibernating once since 1995 (Environment Canada 2015). It does not include maternity roosts, migration routes, and swarming sites as they were not able to be identified (Environment Canada 2015). Five critical overwintering sites are currently known in Alberta: Wood Buffalo National Park in northeastern Alberta (Caceres and Pybus 1997; Environment Canada 2015), Cadomin Cave west of Hinton (Caceres and Pybus 1997; Environment Canada 2015), Jasper National Park off Highway 16 near the Athabasca River, and two sites near Nordegg (Environment Canada 2015). Hibernacula typically contain subterranean features such as caves, abandoned mines, hand-dug wells, cellars or tunnels and physical attributes include locations where light and noise levels were low, temperatures are stable (2 to 10°C) and the sites have stable, high humidity (80%) (Environment Canada 2015).

The Project footprint is unlikely to affect hibernacula sites such as caves, as there is no identified critical habitat adjacent to the Study Area and the existing local topography in the Project Area provides minimal habitat requirements for hibernacula. Little brown myotis may occur in the Project Area as part of their foraging or roosting life requisites, but it is unlikely that critical habitat as defined by SARA will be affected. A hibernacula identified at Mt Saskatchewan in Banff Nation al Park will not be affected by the Project.

Roosting habitat quantity may be affecting by clearing of trees for the Project. Mortality risk for little brown myotis may be affected by changes in roost site availability with clearing of habitat and direct mortality during construction. Increased levels of noise and light associated with increased levels of human activity during construction may reduce bat occurrence and behaviour. Light pollution may fragment networks of travel routes, causing bats to alter their behaviour, which could increase their expended energy (Stone et al. 2009). Stone et al. (2009) found that bat activity in general commenced much later on nights where an artificial light source was present.

3.2.6 Migratory Birds

A wide range of migratory songbird species may breed within the Project Area. The habitat surrounding the Project is fairly uniform throughout consisting of sub-alpine coniferous forest, with the trees getting shorter as elevation increases. Based on a review of range maps, habitat availability, and the eBird database (eBird 2019), it is unlikely that any SARA listed birds will breed within the Project Area. However, most songbird species are protected under the federal *Migratory Bird Convention Act*, and they may be impacted by Project activities.

Loud noises have been shown to have a negative effect on songbirds, resulting in effects such as lowered reproductive potential (Habib et al. 2007), calling interference, singing at a higher pitch (Parris and Schneider 2009), changes in foraging and anti-predator behaviour (Barber et al. 2009), and general avoidance (Bayne et al. 2008). The study area may experience reduced use of adjacent habitats by some species. Habitat use by forest birds is greatly dependent on species-specific tolerances to disturbance. If the Project Area experiences high levels of human activity and operational noise levels (traffic and human presence), habitat effectiveness for forest birds could be reduced up to 300 m into the surrounding area (Bayne et al. 2008).

Songbirds may experience indirect mortality risk from habitat loss due to vegetation clearing and construction and increased levels of predation and parasitism in habitats adjacent to clearings (Thompson et al. 2008, Newton 1998). Mitigation measures such as minimizing vegetation clearing during the breeding season will minimize effects to these species.

As habitat requirements and nesting sites vary greatly between the many songbird species that may breed in the Study Area, it is difficult to determine exact impacts on songbird distribution and abundance.

3.3 Mitigation

This section outlines the best management practices and mitigation measures to reduce impacts of the Project of vegetation and wildlife in the Study Area. Work will be conducted in accordance with PCA's National Best Management Practices – Campground and Day Use Area Maintenance and Modification – Aug 2016 (BMP). PCA'S Impact Assessment Officer (IAO) will review this BIA and advise the functional manager of the Project if and how specific parts of the BMP should be applied.

All Project activities will adhere to design specifications and will be performed in accordance with the established BMP, in compliance with the appropriate approvals and in the context of the recommendations defined in this report. Wood recommends the mitigation measures as described below (organized by discipline).

3.3.1 Construction Site and Equipment

- construction limits will be conspicuously marked with flagging tape to ensure that construction personnel know the disturbance must remain within the proposed footprint;
- all equipment to be used during construction will be free of invasive, non-native plants species. All vehicles and equipment will be cleaned of mud, dirt, grease, etc., prior to arriving on-site to help eliminate the transfer of invasive, non-native plants species;
- the fuelling, servicing, washing and staging of machines and equipment within the vicinity of wetlands will not be permitted. On-site servicing, including fuelling and lubricating equipment will be conducted at least 100 m from any wetland or watercourse to prevent fluids from entering the wetland;
- if fuel is to be stored on-site, then it must be placed within a lined containment berm that is to be located at least 100 m from any wetland or watercourse. The berm is to have a capacity of 110% relative to the volume of fuel being stored;
- drip trays will be places beneath all equipment when it is not operating;
- all runoff from any washing/servicing station or containment area will be controlled such that it does not enter wetland or watercourse areas; and
- a hydrocarbon spill containment kit will be retained on-site to handle the maximum spill potential for substances such as diesel, gasoline and hydraulic fluids that may occur from construction equipment or trucks used on-site.

3.3.2 Soils Handling

- minimize soil disturbance;
- topsoil will be carefully salvaged in order to maintain the propagule/seed bank and following regrading, topsoil will be replaced in similar areas where salvaged or used to reclaim decommissioned portions of the trails;
- topsoil will be stored separately from subsoil;
- soil sterilants and residual herbicides will not be applied to soil;
- soil salvage will be suspended under adverse conditions, such as heavy rainfall, to prevent compaction, admixing and rutting;
- prior to disturbance, appropriate Erosion and Sediment Control (ESC) measures shall be put in place to prevent the mobilization of sediments from stockpiled materials and stripped areas from moving beyond the construction limits and entering waterbodies and/or watercourses;
- ESC measures will be monitored regularly to ensure effectiveness and need for corrective actions;
- ESC measures will be left in place during and after topsoil replacement until vegetative cover has been re-established;
- additional ESC materials (e.g., silt fence, rolls of construction poly) will be kept on-site during the entire construction period in the event of extreme weather requiring ESC repairs (e.g., unexpected rainstorm, flooding);
- ESC measures will be designed to prevent sediment and other debris from moving beyond the construction site boundaries;
- disturbed areas will be revegetated following topsoil replacement by seeding with a weed-free native seed mix appropriate for the site. All seeds must be tested for disease, weed seeds or other foreign materials, and a "Certificate of Seed Analysis" must be obtained from the supplier;
- no fertilizer shall be applied; and
- active construction areas with exposed soils will be watered, as required, to reduce the rising of dust during equipment movement and high winds.

3.3.3 Vegetation

- reduce the Project footprint as much as possible while still maintaining Project objectives for visitor experience and safety;
- if construction is to occur at the viewpoint location, a further survey could be undertaken to determine whether the "Known Range" polygon contains a whitebark pine stand with a basal area of ≥2 m^2/ha (PCA 2019);
- known individual whitebark pine trees adjacent to the Project footprint will be marked and identified to the Project Manager and crew before construction begins (PCA 2019); and
- PCA will obtain permits from Environment Canada for any whitebark pine trees that will be removed as a result of the Project.

3.3.4 Wildlife

The following general mitigation measures would help to reduce the potential for habitat loss, maintain habitat effectiveness and wildlife movement, and minimize wildlife mortality. Mitigation measures follow a hierarchal approach based on avoidance, minimization and finally restitution of effects, as described in the Government of Canada publication *Addressing Species at Risk Act Considerations Under the Canadian Environmental Assessment Act for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada* (Government of Canada 2010):

- reduce threat of predator access to high quality central mountain woodland caribou habitat by ensuring construction activities are restricted to the Project footprint (PCA 2017);
- minimize habitat destruction activities at times of the year when there is a higher risk to disturbing nesting birds during the nesting and rearing periods and is consistent with both federal expectations (i.e., the *Migratory Birds Convention Act*):
  - for migratory birds, these higher risk times are from 25 April to 9 August (ECCC 2018). This is using the outer fringe time period when 6-10% of birds are actively nesting (25-28 April and 8-9 August), and covering the core nesting period. The A4 (Northern Rockies) Region was used to determine the dates (ECCC 2018). However, PCA has indicated that they will use the date of 15 August as an end date for the nesting period of migratory birds to be more conservative; and
  - clearing within the above nesting window may be undertaken pending approval from CWS, provided that a pre-construction nesting survey is completed a maximum of seven days prior to activity for the area to be cleared. Should an active nest or occupied denning site be found during a pre-construction nest survey, vegetation clearing and/or construction activities will be suspended, and appropriate protective buffers will be put in place.
- minimize habitat destruction activities during the migratory bird period to also minimize impacts to bat species (little brown bats are typically active from late April/ May through September/ October);
- minimize habitat clearing during the denning period for grizzly bears (approximately November to April (Vroom et al. 1980));
- dust control measures should be implemented as needed to prevent effects to adjacent breeding and foraging habitat;
- noise reduction mechanisms on construction vehicles should be used, such as properly maintained construction equipment and noise bafflers such as mufflers;
- road speeds should be limited as appropriate to minimize the potential for vehicle-wildlife collisions;
- warning signs should be posted at all Project access points to warn motorists of wildlife hazards;
- all food wastes should be stored indoors or in bear-proof containers to prevent wildlife access to food wastes, as per the Alberta BearSmart program, and then trucked off-site for disposal;

- to reduce the potential for harm to both humans and wildlife, environmental and wildlife awareness programs should be included in site orientations for all Project personnel to ensure awareness of the hazards associated with feeding wildlife and vehicle-wildlife collisions are understood;
- a wildlife sweep of the Project area (plus 50 metres) to identify important wildlife features (e.g., raptor nests, active den sites, etc.) will be conducted prior to construction, during snow-free conditions; and
- if vegetation clearing occurs between the 25 April to 15 August (ECCC 2018) restricted activity period, a nesting bird survey will be conducted to meet the requirements of the federal *Migratory Birds Convention Act* (MBCA 1994).

3.4 Residual Effects Assessment

Residual effects of the Project are those effects that are predicted to persist after successful implementation of all recommended mitigation measures. Assessment criteria are based on *Canadian Environmental Assessment Act* principles (CEAA 2012) (Table 3-4).

Table 3-4: Residual Effects Rating Criteria

Criterion	Description	Criterion Level	Definition
Direction	The gain or loss of the effect in relation to the baseline or existing environment.	Positive	Net gain or benefit to the VC.
		Neutral	No change to the VC.
		Negative	Net loss or adverse effect on the VC.
Magnitude	An indication of the degree of change caused by the Project relative to baseline conditions or guideline values.	Negligible	No discernible change on existing conditions.
		Low	Effect is detectable but within the range of natural variation.
		Moderate	Effect is at or slightly outside of the natural range of variation.
		High	Effect is clearly outside the natural range of variation and /or exceeds established thresholds and causes detectable change in VC.
Geographic Extent	The spatial extent to which a Project effect can be detected.	Site	Effects restricted to the Project Footprint.
		Local	Effects restricted to the study area.
		Regional	Effects extending beyond the study area.
Frequency	The number of times the effect happens over the temporal scope of the Project.	Infrequent	Occurs or has the potential to occur once over the duration of the Project.
		Frequent	Occurs or has the potential to occur periodically over the duration of the Project.
		Continuous	Occurs or has the potential to occur continuously over the duration of the Project.

Criterion	Description	Criterion Level	Definition
Duration	The period over which the natural or human resource effect will be present. The amount of time between the start and end of a Project activity or stressor, plus the time required for the effect to be reversed.	Short-term(1)	Effect occurs during the construction phase.
		Medium-term	Effect continues for up to two years after the construction phase.
		Long-term	Effect continues for the duration of the Project through operation.
Reversibility	An indication of the potential for recovery of the VC from the Project effect. Reversibility implies that the effect will not result in a permanent change to the VC versus similar environments not influenced by the Project.	Reversible	Effect will not result in a permanent change to a VC.
		Not reversible	Effect will result in a permanent change to a VC.
Likelihood	An indication of the chance of the predicted effect occurring.	High	Due to interaction between individuals of a species, habitat or other site conditions and the Project activities, the predicted effect is almost certain to occur.
		Low	Due to a reduced chance of interaction between individuals of a species, habitat or other site conditions and the Project activities, the predicted effect is less certain to occur.

VC = valued component.

Effects to wildlife habitat and species are discussed under the categories of suitable wildlife habitat, habitat effectiveness, movement patterns, and wildlife mortality risks for each of the species assessed.

Habitat availability considers habitat that is used by wildlife for foraging, denning, breeding, and to provide cover from predators and extreme weather conditions. Vegetation removal changes the landscape and directly alters the amount and type of habitat available for use by different species. Natural habitat loss will occur as vegetation is removed during construction. Effects of habitat removal will be long-term, for the life of the infrastructure. There will be no operational effects of habitat removal.

Habitat effectiveness is a measure of changes in habitat use by wildlife that may occur from sensory disturbances during construction and operation activities. Wildlife may avoid using habitats that are otherwise preferred because of the presence of human activity, potentially resulting in increased energy expenditure and lost foraging opportunities (Jalkotzy et al. 1997; Bayne et al. 2008). As a result, habitat in the vicinity of a development is effectively lost. The duration and magnitude of human disturbance, and the behavioural response of a species, will determine whether the extent of the effective habitat loss will be complete or partial, temporary or permanent (Bromley 1985). Effective habitat loss may be greatest in areas of high quality habitat, critical reproductive habitats, such as nest and den sites, and important overwintering areas. Sensory disturbance effects on wildlife are species-specific and can be highly variable among species, with the reaction distances for many species not being well-defined.

Wildlife movement patterns may be disrupted through the development of new infrastructure (e.g., parking lots) that results in habitat fragmentation by physical and sensory barriers. Effects are species-specific and depend on food, territory, and cover requirements. Information on habitat use, locations of potential movement corridors within the Project Area, and species-specific responses to development activities were used to assess potential disruption of movement patterns.

The risk of wildlife mortality is species-specific and has been assessed qualitatively based on the likelihood of a species encountering sources of potential mortality. Mortality may be caused directly by humans (e.g., vehicle-wildlife collisions; destruction of den sites, hibernacula and nests). Indirect mortality occurs when development contributes to other sources of mortality, such as poaching, and management actions associated with the removal of nuisance animals. Loss of habitat, through decreased habitat effectiveness or physical removal, may also contribute to indirect mortality due to increased intra-specific competition for available food and nesting resources, as well as increased predation risk (Thompson et al. 2008).

3.4.1 Vegetation

There are four main range-wide threats to whitebark pine that interact, both compounding and accelerating impacts:

- White Pine Blister Rust;
- climate change;
- fire and fire suppression; and
- Mountain Pine Beetle (ECCC 2017).

There is a projected decline in whitebark pine of over 50% over a 100 year time frame due to white pine blister rust alone (ECCC 2017). The other three range-wide threats will exacerbate this.

Critical Habitat

At local scales, additional human-activity related threats such as the proposed Project will also affect whitebark pine. The impacts of the Project should be considered in the context of cumulative effects on the species (ECCC 2017). Effects such as reduction in the density of cone-bearing and/or non-terminally infected individual trees and damage to substrate in regeneration and seed dispersal habitat are considered destruction of critical habitat (ECCC 2017).

The Project lies within the critical habitat area for whitebark pine (i.e., known range and the 2 km regeneration and recovery zone, the median dispersal distance of Clark's Nutcracker). More detailed maps from ECCC would be required to determine the location within the potential area containing seed dispersal, regeneration and recovery critical habitat and/or potential areas containing regeneration and recovery critical habitat. Recognizing the Project is in the critical habitat area, we do not anticipate an individual is likely to exist or establish in the future in the areas planned for clearing. As a result, impacts associated with reduction in whitebark pine critical habitat are expected to be negative in direction, low in magnitude, regional in extent, continuous, long-term and not reversible, with a high likelihood, as the Project lies within critical habitat as defined by ECCC 2017 (Table 3-5).

Removal of Individual Plants

A survey was conducted on 11 June 2019 by PCA staff to determine whether individual whitebark pine trees or whitebark pine critical habitat is present in the vicinity of the Project area. Within a 50 m vicinity of the parking lot, no whitebark pine trees were found and no forest openings >0.5 ha in size above the minimum elevation threshold with biophysical attributes were found (PCA 2019).

Within a 50 m vicinity of the Peyto Lake viewpoint, 34 whitebark pine trees were recorded (PCA 2019). The closest whitebark pine tree is ~10 m from the existing viewpoint. The habitat survey concluded that it is not likely that the Project area will impact the rooting zones of any existing whitebark pine trees. Potential whitebark pine critical habitat (forest openings with well-to rapidly-drained soils) is found within the Peyto Lake viewpoint Project area and makes up approximately one third of the proposed expanded viewpoint. To define it as critical habitat a more exhaustive survey throughout this "Known Range" polygon would need to be carried out to determine whether this polygon contains a high density of whitebark pine (PCA 2019).

No whitebark pine trees or whitebark pine critical habitat was identified at the parking lots or trails scheduled for construction. At this time, no construction is scheduled for the viewpoint area. As a result, no impacts to whitebark pine are expected as a result of the Project. If construction is to occur at the viewpoint location at a future date, a further survey could be undertaken to determine whether the "Known Range" polygon contains a whitebark pine stand with a basal area of ≥2 m^2/ha (PCA 2019).

Invasive Plants

The Project may result in an increase of the introduction and establishment of invasive plants creating increased competition and reducing the competitive success of whitebark pine. Noxious weeds commonly invade disturbed areas. Assuming weed management will be undertaken following construction, no residual effect associated with invasive plants is anticipated.

Table 3-5: Summary of Residual Effects on Vegetation

Species Assessed	Effect	Direction	Magnitude	Geographic Extent	Frequency	Duration	Reversibility	Likelihood
Whitebark pine	Removal of individual trees	No residual effects predicted						

3.4.2 Wildlife

3.4.2.1 Woodland Caribou

Habitat Availability

Critical habitat for the southern mountain caribou is partially defined with the following thresholds:

- all of the area of high elevation winter and/or summer range;

- within the low elevation winter range, a perpetual state of a minimum of 65% undisturbed habitat in order to provide an overall ecological condition that will allow for an ongoing recruitment and retirement cycle of habitat; and
- matrix range that provides an overall ecological condition that will allow for low predation risk, defined as wolf population densities less than 3 wolves/1,000 km^2 (Environment Canada 2014).

However, the calculation of the 65% undisturbed habitat for the southern mountain ranges have not been completed and, consequently, it has not been determined how much undisturbed habitat remains. As this Project is in the preliminary phase, it is unclear how much habitat removal will take place at this time, but some small amounts of habitat will be lost.

Effects to habitat availability will be regional as habitat removal affects the entire caribou range, since the range is classified as critical habitat. The effects to habitat suitability have a high likelihood of occurring and will be long-term, irreversible and continuous since they will remain in place for the duration of the infrastructure and trails. The magnitude is low as no woodland caribou are in the area currently, and there is existing infrastructure in place at Peyto Lake, which is being expanded.

Habitat Effectiveness

Areas with high levels of human activity and noise levels can reduce habitat effectiveness for woodland caribou both during foraging and calving. During construction of the Project, increased levels of human activity and associated noise could alter habitat effectiveness for caribou. In addition, increased tourists throughout the year could impact caribou habitat use within the vicinity of Peyto Lake. Project effects on habitat effectiveness will be reduced through mitigations such as: ensuring noise abatement equipment is in good working order, restricting construction activities to the approved construction footprint, and implementation of a wildlife awareness program for construction crews.

Effects to mortality risk will be regional as the impacts affect the entire caribou range, since the range is classified as critical habitat. The effects to mortality risk have a low likelihood of occurring because no woodland caribou are in the area currently. Effects will be long-term, irreversible and continuous since they will remain in place for the duration of the infrastructure and trails, and direct mortality is irreversible. The magnitude is low because no woodland caribou are in the area currently, and although there may be opportunities for re-introduction in the future (PCA 2017), it is unclear if caribou would use the area around Peyto Lake.

Movement Patterns

No impacts to movement patterns are anticipated because woodland caribou have been extirpated from this area (GoA 2017; PCA 2017).

Mortality Risk

Calving at high elevations is an important anti-predator strategy for caribou; consequently, habitat alteration at high elevations, or habitat alteration at any elevation that provides access to higher elevations, can lead to increased predation on caribou and compromise recovery objectives (Environment Canada 2014).

Effects to mortality risk will be regional as the impacts affect the entire caribou range, since the range is classified as critical habitat. The effects to mortality risk have a low likelihood of occurring because no woodland caribou are in the area currently. Effects will be long-term, irreversible and continuous since they will remain in place for the duration of the infrastructure and trails, and direct mortality is irreversible. The magnitude is low because no woodland caribou are in the area currently, and although there may be opportunities for re-introduction in the future (PCA 2017), the Project will not increase wolf populations or increase the ease of wolves to hunt compared to what exists presently.

3.4.2.2 Grizzly Bear

Habitat Availability

No impacts to habitat availability for grizzly bear are anticipated, since they are habitat generalists, and use habitat based on distance from human activity (COSEWIC 2012). In addition, only a small amount of vegetation will be cleared, and grizzly bears are wide ranging species, using variable habitats (COSEWIC 2012).

Habitat Effectiveness

Areas with high levels of human activity and noise levels can reduce habitat effectiveness for grizzly bears both during foraging and hibernation. During construction of the Project, increased levels of human activity and associated noise could alter habitat effectiveness for grizzly bears. Project effects on habitat effectiveness will be reduced through mitigations such as: ensuring noise abatement equipment is in good working order, restricting construction activities to the approved construction footprint, implementation of a wildlife awareness program for construction crews, and timing and access restrictions for tourists once the Project is complete if a bear is in the area.

Impacts to habitat effectiveness will be local as the effects from noise and human presence will not impact the region. Residual effects on habitat effectiveness have a high likelihood of occurring because construction of the Project will occur and despite mitigations, noise and human presence will result. Impacts will be long-term, frequent and irreversible since most impacts will occur during construction, but some impacts related to human presence will occur from tourists as they visit the day use area, though for short periods and only during the daytime. The magnitude is low because although noise does impact grizzly bear habits, their home range is very large, and they use a wide variety of habitats.

Movement Patterns

No impacts to movement patterns are anticipated as grizzly bears have large home ranges, and only slight modifications to the parking areas are proposed. This is unlikely to fragment the habitat enough to alter movement patterns of grizzly bears in the area.

Mortality Risk

Mortality risk of grizzly bears may be affected by vegetation clearing, and direct mortality during construction due to bear-human interaction and, potentially, human-induced grizzly mortality (i.e., disturbance or destruction of a den). Grizzly bears are sensitive to increased mortality because of their naturally low reproductive rates.

Project effects on habitat mortality risk will be reduced through mitigations such as: clearing vegetation outside the denning period for bears, restricting construction activities to the approved construction footprint, controlling traffic speeds, implementing of a wildlife awareness program for construction crews, and timing and access restrictions for tourists once the Project is complete if a bear is in the area.

Impacts to mortality risk will be local and have a low likelihood of occurring because although interactions with grizzly bears are possible, effective mitigations are in place. Impacts will be long-term and frequent since most impacts will occur during construction, but some impacts related to human presence will occur from tourists as they visit the Site, though for short periods and only during the daytime. Impacts on mortality risk are irreversible since mortality is permanent. The magnitude is low because grizzly bears have a large home range, they use a wide variety of habitats, and mitigations are effective.

3.4.2.3 Little Brown Myotis

Habitat Availability

The Project is unlikely to affect hibernacula sites such as caves as there is no identified critical habitat in Banff National Park and the existing local topography in the Project Area provides minimal habitat requirements for hibernacula. Little brown myotis may occur in the Project Area as part of their foraging or roosting life requisites, but it is unlikely that critical habitat as defined by SARA will be affected. Roosting habitat quantity may be affecting by clearing of trees for the Project.

Effects to habitat availability will be local as habitat removal is limited to the footprint. The effects to habitat suitability have a high likelihood of occurring and will be long-term and irreversible since they will remain in place for the duration of the infrastructure and trails. The magnitude is low because only a small amount of habitat is being removed, and more information is required to determine if little brown myotis are using the area. Effects occur infrequently as they only happen once over the duration of the Project.

Habitat Effectiveness

No impacts are anticipated to habitat effectiveness for little brown myotis, as vegetation clearing and construction will occur when bats are not present (i.e., outside of the roosting period. Little brown bats are typically active from late April/ May through September/ October (COSEWIC 2013)).

Movement Patterns

No impacts are anticipated to movement patterns for little brown myotis, as vegetation clearing and construction will occur when bats are not present, and when they do return, bats are able to fly over the new clearings, and will typically use forest clearings for foraging. Therefore, it is expected that during operation little brown myotis will be able to fly over the parking lots, and trails, particularly as sensory disturbance will be negligible compared to roads.

Mortality Risk

Mortality risk for little brown myotis may be affected by changes in roost site availability with clearing of habitat. No direct mortality is expected as vegetation clearing will occur when little brown myotis are not present.

Effects to mortality risk are limited to the footprint. The effects to mortality risk have a low likelihood of occurring and will be long-term, frequent and irreversible since they will remain in place for the duration of the infrastructure and trails, and any mortality is permanent. The magnitude is low because only a small amount of uniform habitat is being removed, and more information is required to determine if little brown myotis are using the area.

3.4.2.4 Migratory Birds

Habitat Availability

Migratory birds listed on the SARA Schedule 1 are not expected to breed in the Project Area. However, habitat removal will occur as part of the Project. This will remove some suitable nesting and foraging habitat for migratory birds.

Effects to habitat availability are limited to the footprint. The effects to habitat suitability have a high likelihood of occurring and will be long-term and irreversible since they will remain in place for the duration of the infrastructure and trails. The magnitude is low because only a small amount of uniform habitat is being removed, no SARA listed bird species are expected, and migratory birds are anticipated to use surrounding habitats. Effects occur infrequently as they only happen once over the duration of the Project.

Habitat Effectiveness

No impacts are anticipated to habitat effectiveness for migratory birds, as vegetation clearing and construction will occur when birds are not nesting (i.e., outside the breeding season).

Movement Patterns

No impacts are anticipated to movement patterns for migratory birds, as vegetation clearing, and construction will occur when birds are not nesting (i.e., outside the breeding season). Once birds return, they are expected to be able to fly over the new disturbances.

Mortality Risk

Songbirds may experience indirect mortality risk from habitat loss due to vegetation clearing and construction, increased levels of predation and parasitism in habitats adjacent to clearings, and increased competition for nest sites.

Effects to mortality risk will be local as habitat removal is limited to the footprint. The effects to mortality risk have a low likelihood of occurring and will be long-term, frequent and irreversible since they will remain in place for the duration of the infrastructure and trails, and any mortality is permanent. The magnitude is low because no SARA listed birds are expected to be present, and migratory birds will use surrounding habitats.

3.4.3 Wildlife Residual Effects Summary

A summary of residual effects, after mitigations are applied, for each key VC is presented in Table 3-6. All impacts have a negative direction

Table 3-6: Summary of Residual Effects on Wildlife

Species Assessed	Effect	Direction	Magnitude	Geographic Extent	Frequency	Duration	Reversibility	Likelihood
Woodland caribou	Change in suitable wildlife habitat	Negative	Low	Regional	Continuous	Long-term	Not Reversible	High
	Change in wildlife habitat effectiveness	Negative	Low	Regional	Continuous	Long-term	Not Reversible	Low
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Regional	Continuous	Long-term	Not Reversible	Low
Grizzly Bear	Change in suitable wildlife habitat	No residual effects predicted						
	Change in wildlife habitat effectiveness	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low
Little brown myotis	Change in suitable wildlife habitat	Negative	Low	Site	Infrequent	Long-term	Not Reversible	High
	Change in wildlife habitat effectiveness	No residual effects predicted						
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low
Migratory Birds	Change in suitable wildlife habitat	Negative	Low	Site	Infrequent	Long-term	Not Reversible	High
	Change in wildlife habitat effectiveness	No residual effects predicted						
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low

3.5 Data Gaps

3.5.1 Vegetation

At this time, no construction is scheduled for the Peyto Lake viewpoint area. Within a 50 m vicinity of the viewpoint, 34 whitebark pine trees were recorded (PCA 2019). Potential whitebark pine critical habitat (forest openings with well-to rapidly-drained soils) is found within the Peyto Lake viewpoint Project area and makes up approximately one third of the proposed expanded viewpoint. If construction is to occur at the viewpoint location at a future date, a further survey could be undertaken to determine whether the "Known Range" polygon contains a whitebark pine stand with a basal area of ≥2 m^2/ha (PCA 2019).

3.5.2 Wildlife

A review of existing historical data for the Project concluded that a limited amount of quantitative data are available within the Project Area. Additional wildlife surveys would be required to sufficiently identify existing wildlife constraints and to accurately determine Project-specific impacts to wildlife and wildlife resources for an environmental impact assessment. Suggested surveys include:

- winter track count survey;
- breeding bird point count;
- bat acoustic survey;
- common nighthawk survey; and
- remote camera survey targeting mammals.

Following the *Sensitive Species Inventory Guidelines* (ESRD 2013), most of the field studies would entail repeat surveys (e.g., two surveys) to ensure adequate identification and protection of wildlife species of concern and their habitat. The suggested surveys would provide valuable information on:

- habitat use and habitat occupancy for wildlife species of concern occurring within the Study Area; and
- terrestrial movement corridors through the Study Area.

Baseline data obtained from field surveys should be used in conjunction with data from surrounding Projects, and other wildlife data (e.g., mammal collar data) that PCA has available to confirm impacts on wildlife because of Project activities.

4.0 OTHER CONSIDERATIONS

Other considerations for the Project are identified in the checked boxes below:

☐ Public/stakeholder engagement

☐ Aboriginal engagement or consultation

☒ SARA Notification

In Alberta, woodland caribou (*Rangifer trandus* caribou) are listed as Endangered under the Alberta *Wildlife Act* (AWA 2000). Federally, woodland caribou have been designated as Threatened by COSEWIC (GC 2018) and are on Schedule 1 of SARA. The southern mountain caribou (central group) has been extirpated from the Banff Range (GoA 2017; PCA 2017). A PCA wildlife biologist has reviewed the Project and confirmed that the Project is in a high elevation core caribou Critical Habitat area. As a result, a SARA Authorization will be required.

5.0 SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

As noted in Section 3.4, residual effects of the Project range from no residual effect to low residual effect. A full listing of the residual effects of the Project on the identified VCs is provided in Table 5.1.

Table 5.1: Summary of Residual Effects on Valued Components

Species Assessed	Effect	Direction	Magnitude	Geographic Extent	Frequency	Duration	Reversibility	Likelihood
Whitebark pine	Removal of individual trees	No residual effects predicted						
Woodland caribou	Change in suitable wildlife habitat	Negative	Low	Regional	Continuous	Long-term	Not Reversible	High
	Change in wildlife habitat effectiveness	Negative	Low	Regional	Continuous	Long-term	Not Reversible	Low
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Regional	Continuous	Long-term	Not Reversible	Low
Grizzly Bear	Change in suitable wildlife habitat	No residual effects predicted						
	Change in wildlife habitat effectiveness	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low
Little brown myotis	Change in suitable wildlife habitat	Negative	Low	Site	Infrequent	Long-term	Not Reversible	High
	Change in wildlife habitat effectiveness	No residual effects predicted						
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low
Migratory Birds	Change in suitable wildlife habitat	Negative	Low	Site	Infrequent	Long-term	Not Reversible	High
	Change in wildlife habitat effectiveness	No residual effects predicted						
	Change in wildlife movement patterns	No residual effects predicted						
	Change in wildlife mortality risk	Negative	Low	Local	Frequent	Long-term	Not Reversible	Low

6.0 EXPERTS CONSULTED

Department/Agency/Institution: Parks Canada Agency, Lake Louise, Yoho, and Kootenay Field Unit	Date of Request: May 2019
Expert's Name & Contact Information: Sean Higgins	Title: Environmental Assessment Scientist
Expertise Requested: Advice on the selection of Valued Components for the Project	
Response: Mr. Higgins identified whitebark pine, woodland caribou (central mountain population), grizzly bear, little brown bat and migratory birds as Valued Components based on existing information for known species distributions and historical detections in the area, and listed species (i.e., species listed under SARA (2002), or the COSEWIC (GC 2019)) or other federal legislation (*Migratory Bird Convention Act*).	

Department/Agency/Institution: Parks Canada Agency, Lake Louise, Yoho, and Kootenay Field Unit	Date of Request: June 2019
Expert's Name & Contact Information: Allison Fisher, Annie Zehnder	Title: Resource Management Officer
Expertise Requested: Completion of rare plant survey to identify whitebark pine trees or whitebark pine critical habitat	
Response: Ms. Fisher and Ms. Zehnder completed a rare plant survey on 11 June 2019. A report describing the result of the survey is provided in Appendix A.	

7.0 CLOSURE

This report has been prepared for the exclusive use of Parks Canada Agency. This report is based on, and limited by, the interpretation of data, circumstances, and conditions available at the time of completion of the work as referenced throughout the report and in Appendix B. It has been prepared in accordance with generally accepted engineering practices. No other warranty, express or implied, is made.

Yours truly,

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

Reviewed by:

Ian Campbell, B.Sc., P.Biol.
Senior Environmental Scientist

Mary Ann Lobb, B.Sc., P.Biol., CPM
Associate Ecologist

APEGA Permit to Practice No. P-4546

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9.0 DECISION

Taking into account implementation of mitigation measures outlined in the analysis, the Project is:

☐ not likely to cause significant adverse environmental effects.

☐ likely to cause significant adverse environmental effects.

NOTE: If the Project is identified as likely to cause significant adverse effects, CEAA 2012 prohibits approval of the Project unless the Governor in Council (Cabinet) determines that the effects are justified in the circumstances. A finding of significant effects therefore means the Project CANNOT go ahead as proposed.

10.0 RECOMMENDATION AND APPROVAL (PARKS CANADA RESPONSIBILITY)

Reviewed by:	Date:
EIA Specialist Comments:	
Recommended by:	Date:
Approved by:	Date:
Signature:	

Appendix A

Whitebark Pine Critical Habitat Survey

INFORMATION:

Surveyors: Allison Fisher, Annie Zehnder

Survey date: 11/06/2019

Reason for survey: Lower parking lot upgrade and viewpoint expansion

Project Contacts: Jeanette Goulet (A/Impact Assessment Specialist), Katelyn Shaw (Project Manager)

Accompanying material/data and their storage location:

- Preliminary site plans for both the lower parking lot and viewpoint
- Data points for existing Whitebark Pine (WBP) individuals close to site
- Photos from site visit

Located on the Kootenay drive in Fire&Veg_Vegetation_Management\Whitebark\2019\Critical Habitat Surveys\Peyto Lake Survey:

- Whitebark Pine Known Range WebApp:

  Location: https://van-map3.apca2.gc.ca/arcgiswa/apps/webappviewer/index.html?id=6f95dfad43014f66889a086b8e5b637a

- Recovery Strategy for the Whitebark Pine (*Pinus albicaulis*) in Canada (definition of critical habitat):

  https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_whitebark_pine_e_proposed.pdf

SURVEYS:

1. **Peyto Lake/Bow Summit Day Use Area**

   The Project's intent is to upgrade the day use area by resurfacing the asphalt, replace the washrooms and increase the amount of parking stalls. The site plan shows only a small increase in footprint to the existing infrastructure.

   The lower parking lot is located at 2,070 m and is found above the minimal elevation threshold of WBP, which is 1,900 m for Banff National Park (Parks Canada 2016). It is located outside of any "Known Range" polygons, which are created from ELC and VRI data.

   A survey for individual WBP trees and WBP critical habitat was conducted and covered a 50 m swath beyond the existing parking lot. The vegetation island in the middle of the existing parking lot was also surveyed. No WBP trees were found. No forest openings >0.5 ha in size above the minimum elevation threshold with biophysical attributes were found within the lower parking lot project area.

2. Peyto Lake Viewpoint

According to the site plans, the viewpoint is to undergo an upgrade and expand to twice the size of the existing viewpoint. The Project area is found above the minimum elevation threshold and within a "Known Range" polygon.

Within a 50 m vicinity of the proposed Project area, 34 WBP trees were recorded. The closest WBP tree is ~10 m from the existing viewpoint. It is not likely that the Project area will impact the rooting zones of any existing WBP trees.

Potential WBP critical habitat (forest openings with well-to rapidly-drained soils) is found within the Project area and makes up approximately one third of the proposed expanded viewpoint. To define it as critical habitat, a more exhaustive survey throughout this "Known Range" polygon would need to be carried out to determine whether this polygon contains a high density WBP (i.e., basal area of ≥2 m^2/ha).

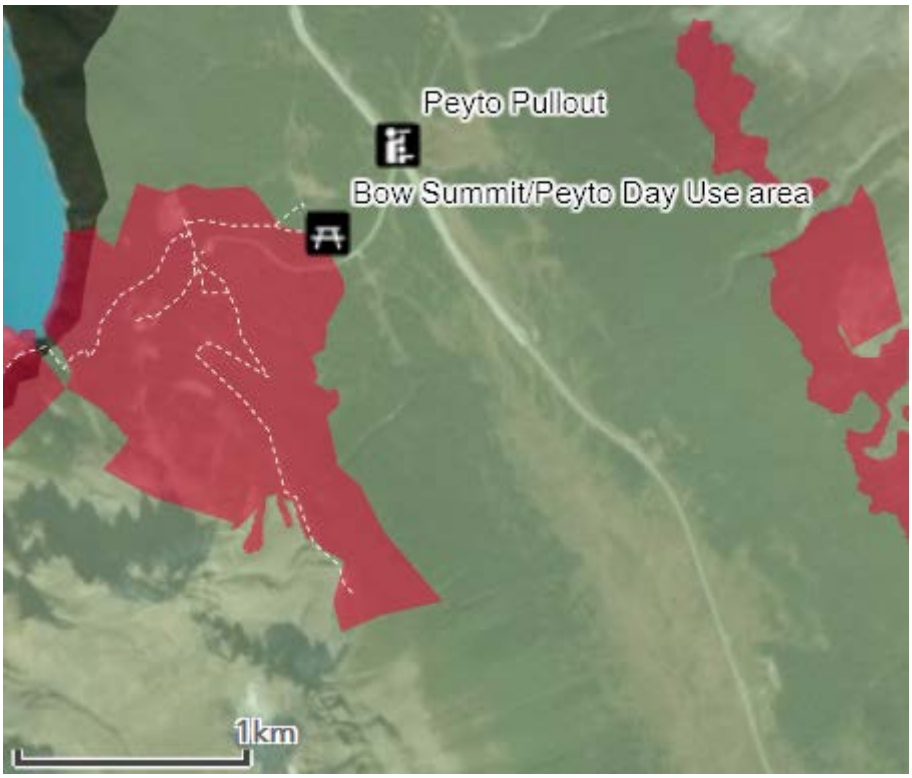

Figure 1: Red denotes "Known Range" Polygons. The polygon surrounding the viewpoint would have to contain a stand of WBP with a basal area of ≥2 m^2/ha to be considered critical habitat.

Figure 2: Area in red shows potential critical habitat within the Project area

Figure 3: Highlighted area is considered as potential critical habitat that could be impacted with viewpoint expansion.

**Figure 4: Closest WBP tree to the existing viewpoint.
Viewpoint railing can be seen along right frame of photo.**

RECOMMENDATIONS

1. A further survey could be undertaken to determine whether the "Known Range" polygon contains a WBP stand with a basal area of ≥2 m^2/ha.
2. If expansion goes ahead at the viewpoint, known individual WBP trees should be marked and pointed out to the Project manager. Extra care should be taken when working in the proximity of these trees and their rooting zones.

REFERENCES

Parks Canada. 2016. *Species at Risk. Area of Potential Critical Habitat for Whitebark Pine (Pinus albicaulis) in the Rocky Mountain National Parks of Canada*. Parks Canada, Gatineau, QC. 27 pp.

Appendix B

Limitations

Limitations

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
   a. The Standard Terms and Conditions which form a part of our Professional Services Contract;
   b. The Scope of Services;
   c. Time and Budgetary limitations as described in our Contract; and
   d. The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in Wood's opinion, for direct observation.
4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal bylaws, orders-in-council, legislative enactments and regulations was not performed.
5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on-site and may be revealed by different or other testing not provided for in our contract.
7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, Wood must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of Wood's services during the implementation of any remedial measures will allow Wood to observe compliance with the conclusions and recommendations contained in the report. Wood's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. Wood accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of Wood.
11. Provided that the report is still reliable, and less than 12 months old, Wood will issue a third-party reliance letter to parties that the client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on Wood's report, by such reliance agree to be bound by our proposal and Wood's standard reliance letter. Wood's standard reliance letter indicates that in no event shall Wood be liable for any damages, howsoever arising, relating to third-party reliance on Wood's report. No reliance by any party is permitted without such agreement.

Appendix 2 - Flexible Pavement Structural Design

Prepared for:

Parks Canada Agency
Banff National Park, Alberta

June 2019
CT184101

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited
5681 70 Street
Edmonton, Alberta T6B 3P6
T: 780-436-2152
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22 March 2019
CT184101

Parks Canada Agency
#401, 1925 – 18 Avenue NE
Calgary, Alberta, T2E 7T8

Attention: **Katelyn Shaw (Project Manager)**
Project Delivery Services West
Strategic Policy and Investment Directorate

Re: Flexible Pavement Structural Design(s)
Rehabilitation and Re-Construction
Peyto Lake Day Use
Banff National Park, Alberta

1.0 INTRODUCTION AND PROJECT DESCRIPTION

The subject project work scope includes the provision of flexible pavement structural design(s) for re-construction and rehabilitation at the subject project. Peyto Lake is a visitor attraction located about 44 km north of Lake Louise, Alberta, on Highway 93. The project consists of two parking lots; lower (east) parking lot and upper (west) parking lot, both currently with asphalt concrete pavement (ACP) surface. It was understood that during field reconnaissance, extensive structural distresses, such as severe ruts and alligator cracks, were observed in the pavement surface within the lower parking lot. The distresses observed in the upper parking lot were considered to be non-discernible.

2.0 FLEXIBLE PAVEMENT DESIGN CONSIDERATIONS

The flexible pavement structural design is based on American Association of State Highway and Transportation Officials (AASHTO) methodologies, in conjunction with Alberta Transportation (AT) Pavement Design Manual. In the absence of heavy vehicle design traffic, and based on AT minimum general recommendations, a default value of 30 Equivalent Single Axle Loading (EASL) per day per direction was considered, that reflects a low traffic volume roadway. It is also comparable to design traffic in a commercial parking area.

The following parameters were utilized in the flexible pavement structural design:

- Design Traffic: 30 ESAL per day per direction
- Traffic Growth: 3% per year
- 20 Year Design Cumulative ESAL: $0.3x10^6$
- Subgrade: Sand (Re: Geotechnical Investigation Report, Wood, 20 January 2019)
- Design Subgrade resilient modulus (M_R): 40 MPa
- Initial Serviceability: 4.2
- Terminal Serviceability: 2.5
- Overall Standard Deviation: 0.45

Two ACP cores were retrieved from the upper parking lot; 73 mm and 112 mm in thickness, with an average thickness of approximately 92 mm.

3.0 RECOMMENDATIONS

Based on the above analysis, the following minimum recommendations are presented:

3.1 LOWER PARKING LOT (RE-CONSTRUCTION)

As presented in the January 2019 Wood Geotechnical Report, the parking lot would be re-constructed. The following two options are presented.

Pavement Component	Option 1 (mm)	Option 2 (mm)
Asphalt Concrete Pavement[1]	100	100
Granular Base Course[2]	280	100
Granular Sub Base Course[3]	….	230

Notes: [1]Alberta Transportation Mix Type M1 with PG 58-28, or comparable
[2]Alberta Transportation Designation 2, Class 20 or comparable
[3]Alberta Transportation Designation 6, Class 80 or comparable

3.2 UPPER PARKING LOT (REHABILITATION OVERLAY)

The average thickness of existing ACP layer, determined with two cores retrieved, was in the order of 92 mm. Considering that no discernible structural distresses were observed, an ACP overlay, 60 mm in thickness, would be considered an adequate treatment. The treatment would provide a service life comparable to the new construction in the lower parking lot.

4.0 CLOSURE

This letter report has been prepared for the exclusive use of Parks Canada Agency for specific application to the project, described within this report. Any use that a third party makes of this report, or any reliance or decisions based on this report are the sole responsibility of those parties. It has been prepared in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is given.

Respectfully submitted,

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

22 March 2019

Sultan Butt, P.Eng

Reviewed By: Tyson Tremblay, P.Eng.
Northern Alberta Materials Branch Manager

Attachments: AASHTO Structural Design(s)

APEGA Permit to Practice Number: P-4546

1997 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

1
1
1
1

Flexible Structural Design Module

Peyto Lake Day Use
Banff National Park, Alberta

(Option No. 1)

Flexible Structural Design

80-kN ESALs Over Initial Performance Period	300,000
Initial Serviceability	4.2
Terminal Serviceability	2.5
Reliability Level	85 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	40,000 kPa
Stage Construction	1
Calculated Design Structural Number	77 mm

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(mm)	Width (m)	Calculated SN (mm)
1	ACP	0.4	1	100	-	40
2	GBC	0.14	1	280	-	39
Total	-	-	-	380	-	79

1997 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

1
1
1
1

Flexible Structural Design Module

Peyto Lake Day Use
Banff National Park, Alberta

(Option No. 2)

Flexible Structural Design

80-kN ESALs Over Initial Performance Period	300,000
Initial Serviceability	4.2
Terminal Serviceability	2.5
Reliability Level	85 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	40,000 kPa
Stage Construction	1
Calculated Design Structural Number	77 mm

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(mm)	Width (m)	Calculated SN (mm)
1	ACP	0.4	1	100	-	40
2	GBC	0.14	1	100	-	14
3	GSBC	0.1	1	230	-	23
Total	-	-	-	430	-	77

Appendix 3 - Geotechnical Investigation Report

Prepared for:

Parks Canada Agency
Banff National Park, Alberta

June 2019
CT184101

Geotechnical Investigation Report

Peyto Lake Day Use Rehabilitation
Peyto Lake, Banff National Park, Alberta
Project No. CT184101

Prepared for:

Parks Canada Agency
Banff National Park, Alberta

25-Jan-19

Geotechnical Investigation Report

Peyto Lake Day Use Rehabilitation

Banff National Park, Alberta

Project No. CT184101

Prepared for:

Parks Canada Agency

Prepared by:

Wood Environment & Infrastructure Solutions

#401, 1925 – 18th Avenue NE
Calgary, AB T2E 7T8

25-Jan-19

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Third-party disclaimer

Table of contents

List of Tables

List of Figures

Appendices

1.0 Introduction

Wood Environment & Infrastructure Solutions (Wood), a division of Wood Canada Limited was retained by Parks Canada Agency (PCA) to conduct a geotechnical investigation for the rehabilitation of the day use area at Peyto Lake located at Banff National Park in Alberta. The purpose of the geotechnical investigation was to investigate the subsoil and groundwater conditions at the site and to provide the geotechnical parameters and recommendations necessary for the rehabilitation and expansion of the asphalt pavement structures at the public parking lots. Geotechnical parameters are also required for construction of self-contained washroom facilities at the northwest end of the lower parking lot. This report summarizes the results of the field investigation and provides geotechnical recommendations for construction of the parking lots.

2.0 Site and Project Description

2.1 Site Description

Peyto Lake is a visitor attraction located about 44 km north of the Lake Louise, Alberta, on Highway 93. There are two parking lots at the lake; a lower (east) parking lot used for light vehicles and an upper (west) parking lot used for both light vehicles and passenger buses. The lower parking lot is located off the site access road about 480 m west of Highway 93 and the upper parking lot is located at the end of the site access road, about 1.1 km west of Highway 93.

The lower parking lot covers an area of about 5,500 m^2; the surface comprises asphalt pavement at various stages of degradation with several large pot holes, extensive rutting, and alligator cracking due to pavement fatigue. Pavement fatigue could be the result of freeze-thaw action or excessive loading of the pavement structure. There is an island located at about the center of the parking lot that is not paved and is covered with grass, bushes, and trees. There is a self-contained, public washroom at the south-east corner of the parking lot. The parking lot is surrounded by thick vegetation; the tree line is about 1 m to 5 m from the edge of the existing pavement.

The upper parking lot covers an area of about 1,900 m^2. Previous visits to the site by Wood personnel indicated that the asphalt pavement in the upper parking area appeared to be in relatively better condition compared to the lower lot and large pot holes, rutting, and alligator cracking did not appear to be as extensive. It is noted that the field investigation occurred during late fall when there was about 300 mm of snow cover, and further visual assessment of the pavement structure was not undertaken at the time of the investigation. The upper lot is surrounded by a wooden fence, and the tree line is about 1 m to 5 m from the edge of the pavement.

2.2 Project Description

Construction at the lower parking lot will include removal and replacement of the existing asphalt pavement and expansion of the current parking lot. It is understood that the current washroom will be demolished and disposed, and a new washroom with greater capacity will be built at the trail head at the north-west corner of the parking lot.

Construction at the upper parking lot will include placement of an asphalt overlay on the current asphalt surface and installation of a self-contained washroom at the east corner of the parking lot. Line painting and the traffic queuing system are not part of the geotechnical scope and will be addressed in the separate Design Development report.

3.0 Geotechnical Investigation

The following subsections present the results of the field investigation.

3.1 Health, Safety, & Permitting

Prior to the field activities, a Hazard Assessment and Safety Plan (HASP) was completed to identify and mitigate the likely hazards that could be encountered during the field activities. Alberta-One-Call was notified of the ground disturbance and an independent contractor was also retained to provide a secondary sweep of the investigation area. It was confirmed that there were no known buried utilities in the area.

PCA reviewed and approved the proposed field work scope and issued a Restricted Activity Permit (RAP). A RAP (over-weight permit) was also issued to mobilize the excavator to site.

Both parking lots were closed off to the public for the duration of the field investigation due to the risk to public safety while the excavator was operating within the parking lots.

3.2 Field Investigation

The field investigation took place on November 5, 2018 and was completed on the same day. The field investigation included test pit excavation, soil logging and sampling, and asphalt coring and sampling. The test pits were excavated using a 135 Hitachi excavator owned and operated by Bow Kor Excavating Ltd. of Exshaw, Alberta. An engineering technician from Wood supervised the investigation, logged the test pits and collected the soil and asphalt samples.

Seven test pits were excavated at the parking lots to characterize and classify the subsurface conditions; six were excavated at the lower parking lot and one test pit was excavated in the area of the proposed washroom at the upper parking lot. The test pits ranged in depth from 0.9 m to 2.0 m. The soil was logged in accordance with the Modified Unified Soil Classification System (MUSCS) and grab samples were collected about every 0.3 m. The test pits were backfilled with the excavation spoil pile and bucket tamped using the excavator bucket and capped with the topsoil from the excavation.

Two asphalt core samples were collected from the upper parking lot to determine asphalt thickness. The samples were collected using a gas-powered asphalt coring drill with a 150 mm diameter coring bit. Asphalt core samples were not collected from the lower parking lot because it is understood that the existing pavement structure will be completely removed and replaced with a new pavement structure.

Table 1 and Table 2 below presents test pit and core hole details, respectively. Test pit and core hole locations are presented on Figure 1 in Appendix A and detailed test pit logs are presented in Appendix B.

Table 1: Test pit Details

Test pit ID	Coordinates[1]		Termination Depth (m bgs)	Ground Water Observations
	Northing (m)	Easting (m)		
TH18-01	5729632	534681	0.9	Dry
TH18-02	5729660	534620	1.0	Dry
TH18-03	5729698	534616	1.0	Wet around 0.6 m bgs
TH18-04	5729680	534571	2.0	Wet around 1.0 m bgs
TH18-05	5729627	534620	1.0	Dry
TH18-06	5729606	534681	1.0	Dry
TH18-07	5729637	534133	1.9	Dry

Notes:
[1] Coordinates based on UTM NAD83 coordinate system and collected using a handheld GPS unit capable of a degree of accuracy ±5 m.
bgs – below ground surface

Table 2: Core Hole Details

Core Hole ID	Coordinates[1]		Sample Thickness (mm)
	Northing (m)	Easting (m)	
CO18-01	5729627	534121	73
CO18-02	5729628	534102	112

Notes:
[1] Coordinates based on UTM NAD83 coordinate system and collected using a handheld GPS unit capable of a degree of accuracy ±5 m.

Further discussion of the subsurface conditions is presented in Section 3.3, below.

3.3 Site Stratigraphy & Groundwater

The site stratigraphy generally comprised topsoil overlying clayey sand above silty sand.

Topsoil was encountered at all seven test pits, and ranged in thickness from 0.05 m to 0.1 m. The topsoil was described as silty with roots and rootlets, dark brown, and was moist.

Clayey sand was encountered below the topsoil at TH18-01 through to TH18-06 at the lower parking lot and ranged in thickness from 0.2 m to 0.3 m. The clayey sand was described as silty with trace gravel, was compact to dense, light to dark brown, contained occasional roots, and was moist.

Below the clayey sand layer was silty sand, which extended to the bottom of the excavations. The silty sand was described as clayey and gravelly, was compact to dense, light brown, and moist. Occasional cobbles were observed at TH18-01, TH18-02, TH18-03, and TH18-05. The cobbles were up to 200 mm in diameter. Boulder size rocks were encountered at TH18-03 and TH18-05 and ranged in diameter from 300 mm to 1500 mm.

Clay was encountered below the topsoil at TH18-07 to a depth of 1.8 m bgs. The clay was described as silty with some gravel, was stiff, low to medium plastic, dark brown, and moist. The excavator met refusal conditions at 1.9 m below ground surface (bgs); however, it was not known if refusal was due to a very large boulder or relatively shallow bedrock.

Groundwater seepage was not observed during test pit excavation; however, wet soil was encountered at 0.6 m and 1.0 m bgs at TH18-03 and TH18-04, respectively.

4.0 Geotechnical Evaluation and Recommendations

The following section provides recommendations for site and subgrade preparation, excavation and backfill, and material specifications.

4.1 Site and Subgrade Preparation

Topsoil and vegetation stripping and grubbing will be required. Stripping and grubbing should extend to non-organic, firm or compact in-situ soil.

The upper 150 mm of the subgrade should be scarified and recompacted to minimum 97 percent of Standard Proctor Method Dry Density (SPMDD), to ensure competent and uniform ground conditions. The subgrade should also be proof-rolled to identify any soft, loose, or wet soil zones. Proof-rolling should be carried out using an 8200 kg axle load, or equivalent and should be monitored by a qualified geotechnical professional. Soft, loose, or wet zones should be over-excavated to underlying competent soil and backfilled with engineered fill, as discussed in section 4.3. Large cobbles or boulders that are above the final subgrade elevation should be removed prior to placement of granular fill.

The final subgrade surface should be sloped at a 2 percent grade to promote drainage. Runoff should be directed to ditches or sumps and managed in accordance with stormwater management requirements.

4.2 Trenching & Excavation

It is expected that excavations up to 2.0 m bgs will be required for the self-contained washrooms. All excavation and trenching shall meet the minimum requirements as set out in Part 32 "Excavating and Tunneling" in the Occupational Health and Safety Code (2009).

Excavation spoil piles shall be set back at least 2 m from the crest of slope for excavations. If weak soils and shallow groundwater seepage are observed within the excavations, this set back distance should be reassessed. It should be noted that soils lose strength over time due to weathering and groundwater effects; therefore, trench slopes and walls should be regularly monitored and inspected for any change in the soil conditions. Where clay till is encountered over the full depth of excavation, side slopes no steeper than 1H:1V are considered appropriate. Excavations through thick sand deposits should be cut no steeper than 2H:1V. Local flattening of the excavation slopes may be required where instabilities of the cut slopes are observed, or where groundwater is encountered. Vertical excavation faces should never exceed 1.5 m in height.

Backfill adjacent to structure walls should consist of clean well-graded granular fill or low to medium plastic cohesive clay, as discussed in section 4.3, below.

It is understood that the excavation for the washrooms will extend to about 2.0 m bgs. The in-situ soils are considered suitable to adequately support the concrete washroom structures. Wet soil was observed at TH18-04 around 1.0 m bgs; therefore, limited groundwater seepage could be expected into the excavation for the washroom. Groundwater seepage into excavations may be managed by constructing sumps with submersible pumps at the corner of the excavation. The base of the excavation should be excavated about 50 mm below final grade and backfilled with a layer of free-draining (low fines) washed or screened rock. Groundwater should be discharged and managed in accordance with the erosion/sedimentation control and water management plan.

As noted in the test pit logs, large cobbles were encountered at random locations and depths. The nature of the soil deposit is highly variable and as such, the presence of very large boulders should be assumed where relatively deep excavations are required for the washrooms. As noted in TH18-07, the excavator encountered digging refusal due either to bedrock or a very large boulder. The excavation equipment

should be capable of removing large boulders. Where relatively strong bedrock is encountered above the planned excavation depth, pneumatic breaker attachments for the excavator may be required. Alternatively, the washrooms could be moved to locations where bedrock is deeper than the planned excavation. Additional test pit excavation would be required to identify subsurface conditions at the new location.

4.3 Construction Fill

Construction fill should consist of engineered fill comprising inorganic low to medium plastic clayey soils or sandy soils, or granular fill comprising well-graded, granular soils.

4.3.1 Engineered Fill

The in-situ sand and clay soils are considered suitable as engineered fill for structural purposes including foundation support, and subgrade construction, or for non-structural (general landscaping) purposes.

Engineered fill should be free of organic material, cobbles larger than 150 mm size and boulders, high plastic clays, and deleterious materials. Frozen soil should not be incorporated into engineered fill, and placement of fill on frozen surfaces should be avoided

For structural applications, engineered fill should be placed in lifts not exceeding 300 mm (loose) and compacted to minimum 98 percent of SPMDD at placement moisture contents between ±2 percent of optimum moisture content (OMC). Engineered fill used for non-structural, landscaping purposes should be placed in lifts not exceeding 500 mm (loose) and should be compacted to minimum 95 percent of SPMDD at moisture contents between ±2 percent of the optimum moisture content.

4.3.2 Granular Fill

Granular fill consists of well-graded gravel that is free of organic material and other deleterious materials and contain less than 10 percent fines. Frozen fill is not acceptable.

All granular fill shall be placed in uniform lifts not exceeding 200 mm thick when fully compacted. Compacted granular fill shall achieve a minimum dry density of 98 percent SPMDD and be placed between ±2 percent of the OMC.

A vibratory, smooth-drum roller should be used to compact granular fill. For compaction adjacent to foundation walls, or other appurtenances, light weight compaction equipment, such as plate tampers, are recommended. It should be noted that reduction in loose lift thickness may be required when lighter equipment is used.

4.4 Pavement Structure

Recommendations for a pavement structure will be provided in the separate Design Development report. Design of the pavement structure should consider usage and traffic loadings, subgrade strength, and environmental effects. Based on the subsurface soil conditions encountered in the test pits, values of 4.50 and 47 MPa are recommended for subgrade California Bearing Ratio (CBR) and soil Resilient Modulus (Mr), respectively. It is recommended that the granular base course meet the Alberta Transportation specification for Designation 2, Class 20 or 25 gravel, and the granular sub-base course meet the AT specification for Designation 6, Class 80 gravel. Other gradations may be used upon review and approval from pavement design engineer.

The gravel structure should be compacted to a minimum of 98 percent of SPMDD. Surface grades of 2 to 3 percent are recommended to minimize infiltration of surface water. Subgrade slopes should be shaped

parallel to the gravel surface. Roadways should be paralleled by ditches or swales with inverts between approximately 0.3 m and 0.5 m below the road subgrade. Ditch backslopes of 3H:1V are recommended. Ditch sideslopes and pavement shoulder slopes may require erosion protection. Provision of adequate drainage is essential to good performance of gravel and asphalt pavement structures.

4.5 Testing and Inspection

All engineering design recommendations presented are based on the assumption that a qualified contractor will be retained to carry out the work, and that an adequate level of monitoring will be provided by Wood during construction. An adequate level of inspection is considered to be:

- For shallow structure foundations: design review and observation of bearing surfaces;
- For earthworks: full time monitoring and compaction testing for any construction fill; and
- For concrete construction: testing of plastic and hardened concrete in accordance with CSA A23.1-00 & A23.2-00 and review of concrete supplier's mix designs for conformance with project specifications.

5.0 Closure

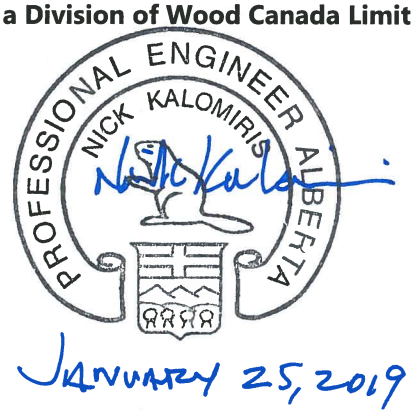
Recommendations presented herein are based on a geotechnical evaluation of the findings from the seven test pits excavated at the site during the geotechnical investigation. If conditions other than those reported are noted during subsequent phases of the work, Wood should be notified and given the opportunity to review the current recommendations in light of any new findings.

Soil conditions by their nature, can be highly variable across a site. A contingency amount should be included in the construction budget to allow for the possibility of variations in soil conditions, which may result in modification of the design and/or changes in construction procedures.

This report has been prepared for the exclusive use of the Parks Canada Agency or their agents for specific application to the development described within this report. This report is based on, and limited by, the interpretation of data, circumstances, and conditions available at the time of completion of the work as referenced throughout the report. Any use that a third party makes of this report, or any reliance or decisions based on this report are the sole responsibility of those parties. It has been prepared in accordance with generally accepted engineering practices. No other warranty, express or implied, is made.

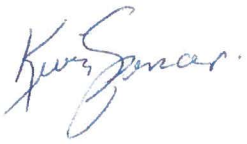
Yours truly,

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited



Nick Kalomiris, P. Eng.
Geotechnical Engineer

Reviewed by:

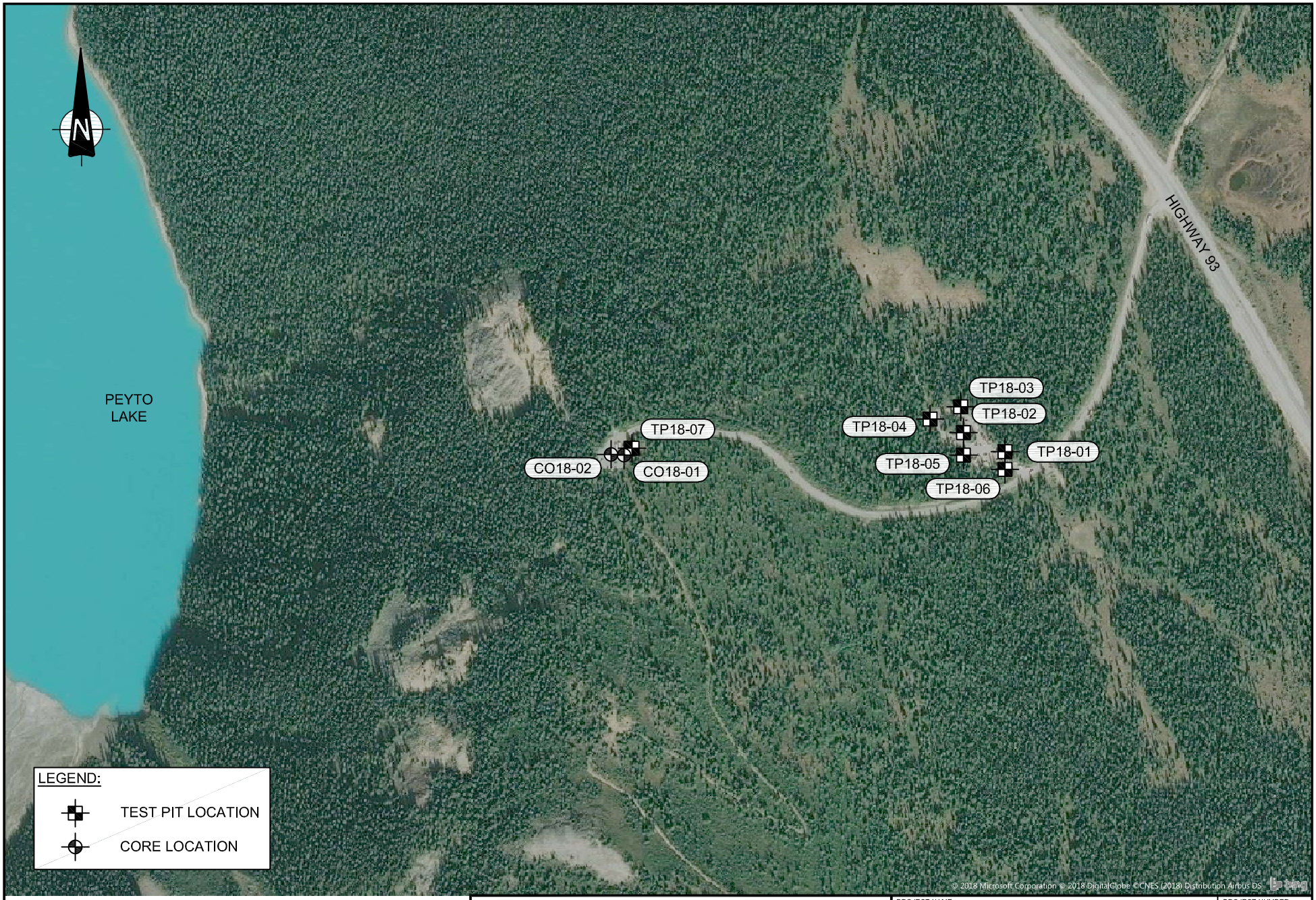


Kevin Spencer, M. Eng., P. Eng.
Senior Associate Geotechnical Engineer

APEGA Permit No.: P-4546

Figure

Test Location Plan



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wood.

CLIENT

PARKS CANADA AGENCY

PROJECT NAME

PEYTO LAKE DAY USE REHAB

SHEET TITLE

TEST PIT LOCATIONS

PROJECT NUMBER

CT184101

FIGURE NUMBER

1

ISSUE/REVISION

A

Appendix A

Test Pit Logs and Explanation of Terms and Symbols

CLIENT: Parks Canada Agency	DRILLED BY: Bow Kor Excavating Ltd.	BORE HOLE NO: **TP18-01**
PROJECT: Peyto Lake Day Use Rehab	DRILLING METHOD: Excavation	PROJECT NO: CT184101
SITE: Peyto Lake, Alberta	N: 5729632 E: 534681 ZONE: Lower Parking Lot	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Cold Patch Asphalt; Bentonite; Drill Cuttings; Gravel; Slough; Sand

BLOW COUNT (N) 20 40 60 80

POCKET PENETROMETER (kPa) 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		OL	**TOPSOIL**, dark brown, moist, occasional roots and rootlets					0
		SC	**SAND**, clayey, silty, trace gravel, compact to dense, light brown, occasional rootlets, moist		G1			
		SM	**SAND**, silty, gravelly (subangular to subrounded, up to 75 mm), some clay, some cobbles (subangular to subrounded, up to 200 mm), occasional boulders (up to 500 mm), compact to dense, light brown, moist		G2			
					G3			
1			**END OF TEST PIT AT 0.9 m** Backfilled with excavation spoil Capped with topsoil					1
2								2
3								3
4								4
5								

wood.

Wood E&IS
401 - 1925 18th Avenue NE
Calgary, Alberta, T2E 7T8

LOGGED BY: SB
ENTERED BY: NK
REVIEWED BY. KS

COMPLETION DEPTH: 0.9 m
COMPLETION DATE: November 5, 2018

CLIENT: Parks Canada Agency	DRILLED BY: Bow Kor Excavating Ltd.	BORE HOLE NO: **TP18-02**
PROJECT: Peyto Lake Day Use Rehab	DRILLING METHOD: Excavation	PROJECT NO: CT184101
SITE: Peyto Lake, Alberta	N: 5729660 E: 534620 ZONE: Lower Parking Lot	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Cold Patch Asphalt; Bentonite; Drill Cuttings; Gravel; Slough; Sand

BLOW COUNT (N) 20 40 60 80

POCKET PENETROMETER (kPa) 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		OL	**TOPSOIL**, dark brown, moist, occasional roots and rootlets					0
		SC	**SAND**, clayey, silty, trace gravel, compact to dense, dark brown, occasional rootlets, moist		G1			
		SM	**SAND**, silty, gravelly (subangular to subrounded, up to 75 mm), trace cobbles (subrounded, up to 100 mm), compact to dense, light brown, moist		G2			
1					G3			1
			END OF TEST PIT AT 1.0 m Backfilled with excavation spoil Capped with topsoil					
2								2
3								3
4								4
5								

wood.
Wood E&IS
401 - 1925 18th Avenue NE
Calgary, Alberta, T2E 7T8

LOGGED BY: SB
ENTERED BY: NK
REVIEWED BY. KS

COMPLETION DEPTH: 1 m
COMPLETION DATE: November 5, 2018

CLIENT: Parks Canada Agency	DRILLED BY: Bow Kor Excavating Ltd.	BORE HOLE NO: **TP18-03**
PROJECT: Peyto Lake Day Use Rehab	DRILLING METHOD: Excavation	PROJECT NO: CT184101
SITE: Peyto Lake, Alberta	N: 5729698 E: 534616 ZONE: Lower Parking Lot	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Cold Patch Asphalt; Bentonite; Drill Cuttings; Gravel; Slough; Sand

BLOW COUNT (N) 20 40 60 80

POCKET PENETROMETER (kPa) 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		OL	**TOPSOIL**, reddish brown, moist, occasional roots and rootlets					0
		SC	**SAND**, clayey, silty, trace gravel, compact to dense, dark brown, occasional rootlets, moist		G1			
			SAND, silty, clayey, gravelly (subangular to subrounded, up to 50 mm), occasional cobbles (angular to subangular, up to 200 mm), compact to dense, light brown, moist		G2			
		SM	... light brown, wet					
			... occasional boulders (subrounded, up to 300 mm)		G3			
1			**END OF TEST PIT AT 1.0 m** Backfilled with excavation spoil Capped with topsoil					1
2								2
3								3
4								4
5								

wood.
Wood E&IS
401 - 1925 18th Avenue NE
Calgary, Alberta, T2E 7T8

LOGGED BY: SB
ENTERED BY: NK
REVIEWED BY. KS

COMPLETION DEPTH: 1 m
COMPLETION DATE: November 5, 2018

CLIENT: Parks Canada Agency	DRILLED BY: Bow Kor Excavating Ltd.	BORE HOLE NO: **TP18-04**
PROJECT: Peyto Lake Day Use Rehab	DRILLING METHOD: Excavation	PROJECT NO: CT184101
SITE: Peyto Lake, Alberta	N: 5729680 E: 534571 ZONE: Lower Parking Lot	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Cold Patch Asphalt; Bentonite; Drill Cuttings; Gravel; Slough; Sand

BLOW COUNT (N) 20 40 60 80

POCKET PENETROMETER (kPa) 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		OL	**TOPSOIL**, dark brown, moist, occasional roots and rootlets					0
		SC	**SAND**, clayey, silty, trace gravel, compact to dense, dark brown, occasional rootlets, moist					
			SAND, silty, clayey, gravelly (subangular to subrounded, up to 50 mm), compact to dense, light brown, moist		G1			
			... occasional boulders (subangular, up to 150 mm)		G2			
					G3			
1		SM	... wet		G4			1
					G5			
					G6			
2			**END OF TEST PIT AT 2.0 m** Backfilled with excavation spoil Capped with topsoil					2
3								3
4								4
5								

BOREHOLE LOGS.GPJ 18/11/20 09:35 AM (2018-WOOD LIBRARY.GLB)(GEOTECHNICAL_2018 WOOD)

wood.

Wood E&IS
401 - 1925 18th Avenue NE
Calgary, Alberta, T2E 7T8

LOGGED BY: SB	COMPLETION DEPTH: 2 m
ENTERED BY: NK	COMPLETION DATE: November 5, 2018
REVIEWED BY. KS	Page 1 of 1

CLIENT: Parks Canada Agency	DRILLED BY: Bow Kor Excavating Ltd.	BORE HOLE NO: **TP18-05**
PROJECT: Peyto Lake Day Use Rehab	DRILLING METHOD: Excavation	PROJECT NO: CT184101
SITE: Peyto Lake, Alberta	N: 5729627 E: 534620 ZONE: Lower Parking Lot	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Cold Patch Asphalt; Bentonite; Drill Cuttings; Gravel; Slough; Sand

BLOW COUNT (N) 20 40 60 80

POCKET PENETROMETER (kPa) 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		OL	**TOPSOIL**, reddish brown, moist, occasional roots and rootlets					0
		SC	**SAND**, clayey, silty, trace gravel, compact to dense, dark brown, occasional rootlets, moist					
		SM	**SAND**, silty, clayey, gravelly (subangular to subrounded, up to 50 mm), occasional cobbles (angular to subangular, up to 100 mm), compact to dense, light brown, moist		G1			
					G2			
			... boulders (up to 1500 mm)		G3			
1			**END OF TEST PIT AT 1.0 m** Backfilled with excavation spoil Capped with topsoil					1
2								2
3								3
4								4
5								

wood.
Wood E&IS
401 - 1925 18th Avenue NE
Calgary, Alberta, T2E 7T8

LOGGED BY: SB	COMPLETION DEPTH: 1 m
ENTERED BY: NK	COMPLETION DATE: November 5, 2018
REVIEWED BY. KS	Page 1 of 1

CLIENT: Parks Canada Agency	DRILLED BY: Bow Kor Excavating Ltd.	BORE HOLE NO: **TP18-06**
PROJECT: Peyto Lake Day Use Rehab	DRILLING METHOD: Excavation	PROJECT NO: CT184101
SITE: Peyto Lake, Alberta	N: 5729606 E: 534681 ZONE: Lower Parking Lot	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Cold Patch Asphalt; Bentonite; Drill Cuttings; Gravel; Slough; Sand

BLOW COUNT (N) 20 40 60 80

POCKET PENETROMETER (kPa) 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		OL	**TOPSOIL**, dark brown, moist, occasional roots and rootlets, coal odour					0
		SC	**SAND**, clayey, silty, trace gravel, compact to dense, dark brown, occasional rootlets, moist					
			SAND, silty, clayey, gravelly (subangular to subrounded, up to 75 mm), compact to dense, light brown, moist		G1			
		SM	... occasional cobbles (subangular, up to 200 mm)		G2			
1					G3			1
			END OF TEST PIT AT 1.0 m Backfilled with excavation spoil Capped with topsoil					
2								2
3								3
4								4
5								

BOREHOLE LOGS.GPJ 18/11/20 09:35 AM (2018-WOOD LIBRARY.GLB)(GEOTECHNICAL_2018 WOOD)

wood.

Wood E&IS
401 - 1925 18th Avenue NE
Calgary, Alberta, T2E 7T8

LOGGED BY: SB	COMPLETION DEPTH: 1 m
ENTERED BY: NK	COMPLETION DATE: November 5, 2018
REVIEWED BY. KS	Page 1 of 1

CLIENT: Parks Canada Agency	DRILLED BY: Bow Kor Excavating Ltd.	BORE HOLE NO: **TP18-07**
PROJECT: Peyto Lake Day Use Rehab	DRILLING METHOD: Excavation	PROJECT NO: CT184101
SITE: Peyto Lake, Alberta	N: 5729637 E: 534133 ZONE: Upper Parking Lot	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Cold Patch Asphalt; Bentonite; Drill Cuttings; Gravel; Slough; Sand

BLOW COUNT (N) 20 40 60 80

POCKET PENETROMETER (kPa) 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		OL	**TOPSOIL**, dark brown, moist, occasional roots and rootlets					0
			CLAY, silty, sandy, some gravel, stiff, low to medium plastic, dark brown, occasional rootlets, moist					
					G1			
					G2			
					G3			
1		CI	... occasional cobbles (subangular to subrounded, up to 200 mm)					1
					G4			
					G5			
					BS1			
					G6			
2			**END OF TEST PIT AT 1.9 m** Backfilled with excavation spoil Capped with topsoil				... digging refusal at 1.9 m, possible very large boulder or bedrock surface	2
3								3
4								4
5								

Wood E&IS
401 - 1925 18th Avenue NE
Calgary, Alberta, T2E 7T8

LOGGED BY: SB
ENTERED BY: NK
REVIEWED BY. KS

COMPLETION DEPTH: 1.9 m
COMPLETION DATE: November 5, 2018

EXPLANATION OF TERMS AND SYMBOLS

The terms and symbols used on the borehole logs to summarize the results of field investigation and subsequent laboratory testing are described in these pages.

It should be noted that materials, boundaries and conditions have been established only at the borehole locations at the time of investigation and are not necessarily representative of subsurface conditions elsewhere across the site.

TEST DATA

Data obtained during the field investigation and from laboratory testing are shown at the appropriate depth interval.

Abbreviations, graphic symbols, and relevant test method designations are as follows:

*C	Consolidation test	*ST	Swelling test
D_R	Relative density	TV	Torvane shear strength
*k	Permeability coefficient	VS	Vane shear strength
*MA	Mechanical grain size analysis	w	Natural Moisture Content (ASTM D2216)
	and hydrometer test	w_l	Liquid limit (ASTM D 423)
N	Standard Penetration Test (CSA A119.1-60)	w_p	Plastic Limit (ASTM D 424)
N_d	Dynamic cone penetration test	E_f	Unit strain at failure
NP	Non plastic soil	γ	Unit weight of soil or rock
pp	Pocket penetrometer strength (kg/cm²)	γ_d	Dry unit weight of soil or rock
*q	Triaxial compression test	ρ	Density of soil or rock
q_u	Unconfined compressive strength	ρ_d	Dry Density of soil or rock
*SB	Shearbox test	C_u	Undrained shear strength
SO_4	Concentration of water-soluble sulphate	→	Seepage
		▼	Observed water level

* The results of these tests are usually reported separately

Soils are classified and described according to their engineering properties and behaviour.

The soil of each stratum is described using the Unified Soil Classification System[1] modified slightly so that an inorganic clay of “medium plasticity” is recognized.

The modifying adjectives used to define the actual or estimated percentage range by weight of minor components are consistent with the Canadian Foundation Engineering Manual[2].

Relative Density and Consistency:

Cohesionless Soils		Cohesive Soils		
Relative Density	SPT (N) Value	Consistency	Undrained Shear Strength c_u (kPa)	Approximate SPT (N) Value
Very Loose	0-4	Very Soft	0-12	0-2
Loose	4-10	Soft	12-25	2-4
Compact	10-30	Firm	25-50	4-8
Dense	30-50	Stiff	50-100	8-15
Very Dense	>50	Very Stiff	100-200	15-30
		Hard	>200	>30

Standard Penetration Resistance (“N” value)
The number of blows by a 63.6kg hammer dropped 760 mm to drive a 50 mm diameter open sampler attached to “A” drill rods for a distance of 300 mm.

1 “Unified Soil Classification System”, Technical Memorandum 36-357 prepared by Waterways Experiment Station, Vicksburg, Mississippi, Corps of Engineers, U.S. Army. Vol. 1 March 1953.

2 ”Canadian Foundation Engineering Manual”, 4th Edition, Canadian Geotechnical Society, 2006.

MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

MAJOR DIVISION			GROUP SYMBOL	GRAPH SYMBOL	COLOUR CODE	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm)	GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm	CLEAN GRAVELS (LITTLE OR NO FINES)	GW		RED	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	$C_U = \frac{D_{60}}{D_{10}} > 4$; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			GP		RED	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY GRAVELS (WITH SOME FINES)	GM		YELLOW	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12 %	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			GC		YELLOW	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7
	SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm	CLEAN SANDS (LITTLE OR NO FINES)	SW		RED	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	$C_U = \frac{D_{60}}{D_{10}} > 6$; $C_C = \frac{(D_{60})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			SP		RED	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY SANDS (WITH SOME FINES)	SM		YELLOW	SILTY SANDS, SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12 %	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			SC		YELLOW	CLAYEY SANDS, SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm)	SILTS BELOW "A" LINE NEGLIGIBLE ORGANIC CONTENT	W_L< 50%	ML		GREEN	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)	
		W_L< 50%	MH		BLUE	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDS OR SILTY SOILS		
	CLAYS ABOVE "A" LINE NEGLIGIBLE ORGANIC CONTENT	W_L< 30%	CL		GREEN	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS		
		30% <W_L< 50%	CI		GREEN-BLUE	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS		
		W_L> 50%	CH		BLUE	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
	ORGANIC SILTS & CLAYS BELOW "A" LINE	W_L< 50%	OL		GREEN	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	WHENEVER THE NATURE OF THE FINES CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER "F", E.G. SF IS A MIXTURE OF SAND WITH SILT OR CLAY	
		W_L> 50%	OH		BLUE	ORGANIC CLAYS OF HIGH PLASTICITY		
HIGHLY ORGANIC SOILS			Pt		ORANGE	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR, AND OFTEN FIBEROUS TEXTURE	

SPECIAL SYMBOLS

LIMESTONE		OILSAND	
SANDSTONE		SHALE	
SILTSTONE		FILL (UNDIFFERENTIATED)	

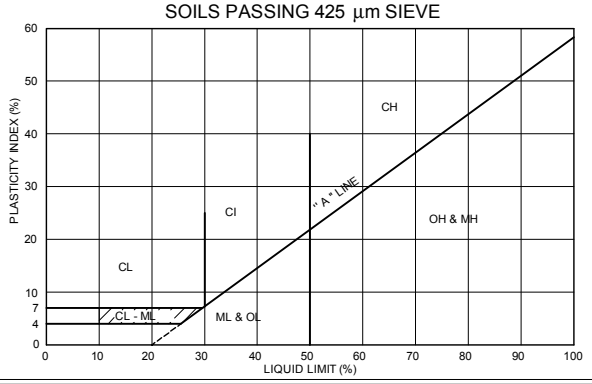
SOIL COMPONENTS

FRACTION	U.S. STANDARD SIEVE SIZE		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
GRAVEL	PASSING	RETAINED	PERCENT	DESCRIPTOR
COARSE	76mm	19mm	35-50	AND
FINE	19mm	4.75mm		
SAND			20-35	Y/EY
COARSE	4.75mm	2.00mm		
MEDIUM	2.00mm	425µm	10-20	SOME
FINE	425µm	75µm		
FINES (SILT OR CLAY BASED ON PLASTICITY)	75µm		1-10	TRACE

OVERSIZED MATERIAL

ROUNDED OR SUBROUNDED:	NOT ROUNDED:
COBBLES 76mm TO 200mm	ROCK FRAGMENTS > 76mm
BOULDERS > 200mm	ROCKS > 0.76 CUBIC METRE IN VOLUME

PLASTICITY CHART FOR SOILS PASSING 425 µm SIEVE



NOTES:

1. ALL SIEVE SIZES MENTIONED ON THIS CHART ARE U.S. STANDARD A.S.T.M. E.11
2. COARSE GRAIN SOILS WITH 5 TO 12% FINES GIVEN COMBINED GROUP SYMBOLS, E.G. GW-GC IS A WELL GRADED GRAVEL SAND MIXTURE WITH CLAY BINDER BETWEEN 5 AND 12% FINES.

amec foster wheeler