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# PCA

Wayii Trail Construction  
Pacific Rim National Park Reserve, BC  
Project No. PCA #1522

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- Wayii Area, Upscheek Tashee Multi-Use Path Pacific Rim National Park Reserve, Vancouver Island, BC, Geotechnical Assessment. By WSP Canada Inc. Dated February 2021.

**END OF SECTION**

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**PART 1 – GENERAL**

- 1.1 Precedence .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Specifications document.
- 1.2 Definitions .1 “Parks Canada Agency”, abbreviated as “PCA” and “Parks Canada, abbreviated as “PC” shall mean one and the same.
- .2 “Department” shall mean Parks Canada and is abbreviated as “PC”.
- .3 “Departmental Representative”, abbreviated as “DR” shall mean the person designated by written notice at time of award of contract from PC to the Contractor, to be recognized as the Departmental Representative and shall perform the following:
- .1 Is responsible for all matters concerning the technical content of the work under the contract
- .2 Authorized to issue notices, instructions, and changes within the scope of the Work, relevant to the contract
- .3 Accept on behalf of Canada any notice, order or other communication from the contractor relating to the Work
- .4 Within a reasonable time, review and respond to submissions made by the Contractor in accordance with the requirements of the Contract.
- The DR has no authority to authorize changes to the Contract terms and conditions of the Contract.
- The DR may appoint additional persons to act on their behalf in inspecting and monitoring the Work.
- .4 "Contracting Authority" shall be recognized as the authority delegated by PC to enter into contracts, amend the contracts and is responsible for all matters concerning and interpretation of the terms and conditions of the Contract. The Contracting Authority is responsible for the management of the Contract and any changes to the Contract terms and conditions must be authorized in writing by the Contracting Authority.
- .5 “Owner” shall mean Parks Canada, Coastal BC Field Unit, Pacific Rim National Park Reserve.
- .6 “Contractor” shall mean the person, firm, or corporation identified as such in the *Agreement* and includes the *Contractors* authorized representative.
- .7 “Owners Archaeological Monitor” (OAM) is an individual retained by PCA to assess and monitor for the presence/absence of cultural resource sites and recommend and implement mitigations if Chance Finds are encountered.
- .8 “Owner’s Environmental Monitor” (OEM) shall mean a representative appointed by PCA for the purpose of execution of the contract.
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- .9 “First Nations Monitor” (FNM) shall mean a representative appointed by the local First Nations governments to monitor various aspects of the contract and will work through the OAM, the OEM, and the DR to address concerns, observations, and directives that are of interest to the First Nations People.
- .10 “Elevated Trail” shall mean that portion of the trail the underside of which is elevated above the ground on average approximately 0.4 metres, except directly under stringers, or as agreed by the OEM through ephemeral ponds and bog area. This portion of the trail consists of timber decking supported on helical piles.
- 1.3. Hierarchy of Documents
- .1 In the event of discrepancies or conflict in the contents of the contract documents, the hierarchy of such documents shall be as specified in the General Conditions of the Contract, GC1.2.2 - Order of Precedence.
- .2 In the event of any discrepancy or conflict in the information contained in the drawings and specifications, the rules as specified in the General Conditions of the Contract, GC1.2.2 - Order of Precedence shall apply.
- .3 In the event of discrepancies between the technical specifications, the order of hierarchy shall be as follows, in descending order:
- .1 These Specifications.
- .2 BC MoTI Specifications.
- .4 In the event of a difference between scaled dimensions on Plans and the figures written thereon, the figures shall govern. In the event that two or more plans show conflicting information, the information on the most recently dated plan shall govern. When both plans were issued on the same date, the drawings of larger scale govern over those of smaller scale.
- .5 Any technical and manufacturer’s standard, Government Act, Regulation or Code of Practice referred to in the Contract documents shall be the version current at the time the Contract is awarded.
- .6 If conflict arises between an item in the main body of these Specifications (Division 1 – Division 34) and an item found in one of the Appendices or Reference Documents, the main body of the Specifications (Division 1 – Division 34) shall govern.
- .7 All such conflicts as noted above shall immediately be brought to the attention of the DR for confirmation of dimensions, specifications, and conditions.
- 1.4 Codes, Bylaws, Standards
- .1 Perform work to CURRENT Codes, Construction Standards and Bylaws, including Amendments.
- .2 The Contractor shall abide by the ordinances, laws, rules, and regulations set out in the Canada National Parks Act and Regulations. Refer to Clause 1.17.4 of this specification for additional information.
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- .3 Perform work in accordance with the Canadian Standards Association, the American Society for Testing of Materials, British Columbia Building Code, TAC Geometric Guidelines, BC supplement to TAC, BC supplement to CHBDC and other indicated Codes, MOTI Pavement Structure Design Guidelines Technical Circular T-01/15, Master Municipal Construction Documents MMCD, Construction Standards and/or any other Code or Bylaw of local application.
  - .4 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.
  - .5 Comply with all federal environmental legislation and regulations including Fisheries Act, Canada National Parks Act, Species at Risk Act, and Migratory Bird Convention Act.
  - .6 Meet or exceed requirements of Contract documents, specified standards, codes, and referenced documents.
  - .7 In any case of conflict or discrepancy, the most stringent requirements shall apply.
- 1.5 Contract Documents
- .1 The Contract Documents, drawings and specifications, are intended to complement each other, and to provide for and include everything necessary for the completion of the Work.
  - .2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the Work.
  - .3 If anything is found by the Contractor to be missing from the Contract Documents immediately inform the DR.
- 1.6 Other Contracts
- .1 Further Contracts within the Park boundaries and/or within the project boundaries may be awarded while this contract is in progress.
  - .2 The Upscheek Ta-Shee Trail grade Contractor, Hazelwood Construction Ltd. of Nanaimo BC may still be active adjacent with deficiency work to the site depending upon the date the work is started.
  - .3 The Upscheek Ta-Shee Trail paving Contractor may still be active adjacent to the site with deficiency work depending upon the date the work is started
  - .3 Cooperate with other Contractors in carrying out their respective works, including BC Hydro, and carry out instructions from DR.
  - .4 Coordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to DR, in writing, any defects which may interfere with proper execution of this Work.
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- 1.7 Division of Specifications .1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.
- .2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.
- 1.8 Project Location .1 The project is located near Highway 4, in the Long Beach Unit of Pacific Rim National Park Reserve, British Columbia approximately 1 km. north of the Park Reserve Administration Building. This project is part of a plan to create a multiuse pathway between Tofino, BC and Ucluelet, BC.
- 1.9 Time of Completion .1 Substantial completion of the work shall be achieved by August 31, 2021.
- 1.10 Contract Method .1 Construct Work under a Unit Price Contract.
- 1.11 Section Includes .1 In general, Work under this Contract covers the:
- .1 Trail construction including excavations, grading, filling, retaining wall construction, handrails, signs, culvert installations, drainage, and landscaping.
- .2 Place and compact hot mix asphalt pavement on the trail.
- .3 Pavement markings.
- .4 Control of invasive plant species in work done by Contractor.
- 1.12 Work Included .1 Work includes, but is not limited to:
- .1 General works:
- .2 Coordination and co-operation with environmental, archeology, and First Nations Monitors to protect features within the Park Reserve.
- .3 Protection and preservation of watercourses.
- .4 Provision of the Traffic Control Plan and all traffic control and site security throughout the duration of the Works. Provision of other work plans as detailed in the project specifications.
- .5 Supply and install two project signs (1,2 m X 2.4 m) on Highway 4.
- .2 Trail Construction including supply of materials:
- .1 Maintaining, and removal of temporary access points for trail construction.
- .2 Clearing of brush, fallen timber, grubbing and removal from site roots, organics, and woody debris from the proposed trail alignment
- .3 Salvage, stockpile, and replacement throughout site of organics, woody debris & stumps, as per direction of the OEM
- .4 Excavation, filling, shaping, and disposal of surplus material.
- .5 Placement, and compaction of imported granular materials.
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- .6 Placement of root barriers, geotextiles, and erosion control materials as required.
  - .7 Installation of culverts, pipes, and drainage features.
  - .8 Construction of retaining walls.
  - .9 Placing and compacting granular subgrade fill, subbase, and base course to a uniform cross fall and profile.
  - .10 Installing safety railings and signs.
  - .11 Restoring and shaping the trail shoulders and all cut and fill slopes with salvaged native soils and woody debris. Select Cut/ fill slopes will have ECB.
  - .12 Installing rip rap where required.
  - .13 Place and compact hot mix asphalt pavement for the trail, highway widening, and highway culvert crossing.
  - .14 Apply thermoplastic or MMA (Methyl Methacrylate) to the new trail pavement as shown on the drawings and as specified.
  - .15 Place salvaged organics min 150mm thick outside of trail shoulder along newly paved trail. To match pavement surface place 0.2m wide granular base on either side of trail edge.
  - .16 Installing landscape materials as shown on the drawings and as directed by the DR.
- 1.13 Contractor's Responsibility
- .1 Coordination and communication with other Contractors, OEM, OAM, DR, and agencies involved with Project, if applicable.
  - .2 Give all required Notices and comply with all local, provincial, and federal laws, bylaws, ordinances, rules, regulations, codes, and orders relating to the Work which are or become in force during the Performance of the Work.
  - .3 As Prime Contractor, coordinate all the Work and provide all labour, materials, equipment, and services necessary for delivery, storage, handling, protection, installation, removal, inspection, and replacement or maintenance as required to provide a complete Project.
  - .4 All persons working for the Prime Contractor, including all sub-contractors, are required to attend a tailgate meeting with Park Reserve Administration personnel and OEM at the Pacific Rim National Park Reserve Administration Building regarding procedures for working within the Park Reserve. More than one meeting can be arranged to accommodate the Contractor's schedule and work forces. The training meeting will require about 2 hours to complete.
  - .5 The Prime Contractor shall have senior personnel attend a start-up meeting with both the Tla-o-qui-aht First Nation and Ucluelet First Nation Communities. This meeting provides an opportunity to present to the Nations the Contractor's schedule and work methodology, as well as an opportunity for the Nations to share with the Contractor available labour and service opportunities.
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- .6 The Contractor shall also allow for senior personnel to attend a meeting before starting any works with the Elders Working Group. The purpose of this meeting is to provide the Contractor with an understanding of the protocol/teachings of working respectfully within the Nations Hahoulthee (traditional territories).
  - .7 All persons working for the Prime Contractor, including all sub-contractors and their employees shall adhere to the restrictions and requirements set out in these specifications.
- 1.14 Conforming and Alternative Details
  - .1 All details shall conform to the Contract Documents and Drawings. The Contractor may propose alternative details to the DR. Any request proposing a change to the Contract must be submitted in writing to the DR, in accordance with 01 33 00 - Submittal Procedures, clearly identifying the reason for the change and any cost savings or extra cost.
  - .2 The submission shall include, where appropriate, drawings or technical letter of the alternative detail prepared and sealed by a professional engineer registered with EGBC.
  - .3 If the alternative detail represents a clear improvement, it may be accepted without any price adjustment.
  - .4 If the alternative detail is accepted in whole or in part, the Contractor shall be responsible for all additional costs related to other parts of the work which arise due the alternative detail.
  - .5 The Contractor shall be responsible for all costs related to drawing and design changes required as a result of the substitution.
  - .6 The DR reserve the right to reject any proposed alternative details.
- 1.15 Work Schedule
  - .1 Carry on work as follows:
    - .1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the Work within the time required by the Contract documents. Indicate the following:
      - .1 Submission of shop drawings, product data, MSDS sheets, and samples.
      - .2 Restrictions for traffic lane closures. No closures are permitted on long weekends from May through September.
      - .3 Commencement and completion of Work of each section of the specifications or drawings as outlined.
      - .4 Take into consideration heavy rainfall delays based upon historical rainfall events.
      - .5 Final completion date within the time required by the Contract documents.

- .2 Do not change approved Schedule without notifying DR.
  - .3 Interim reviews of work progress based on work schedule will be conducted as decided by DR and schedule updated by Contractor in conjunction with and to approval of DR.
  - .4 No work will be permitted within existing parking lots and no storage of materials or equipment will be permitted in public parking lots between the Victoria Day long weekend and the Labour Day long weekend, inclusive, except with the written permission of the DR.
- 1.16 Documents Required
- .1 Maintain 1 copy each of the following at the job site:
    - .1 Contract drawings.
    - .2 Contract specifications.
    - .3 Addenda to Contract documents.
    - .4 Copy of approved work schedule.
    - .5 Reviewed/approved shop drawings.
    - .6 Change orders.
    - .7 Other modifications to Contract.
    - .8 Field test reports.
    - .9 Reviewed/approved samples.
    - .10 Manufacturers' installation and application instructions.
    - .11 One set of record drawings and specifications for "as-built" purposes.
    - .12 Current construction standards of workmanship listed in technical Sections.
    - .13 Project Safety Plan / reviewed Traffic Control Plan.
    - .14 Copy of approved Work schedule.
    - .15 Labour conditions and wage schedules.
    - .16 Pacific Rim National Park Reserve Business License.
    - .17 Environmental and Cultural Resources Procedures.
    - .18 Environmental Report & Drawings (To be issued at award - Confidential, to be secured.)
    - .19 Archeological Report and Drawings (To be issued at award - Confidential, to be secured.)
    - .20 Owner's Environmental Management Plan (EMP) (To be issued at Award.)
    - .21 Owner's Cultural Resources Protection Plan (CRPP) (To be issued at Award.)
    - .22 Copy of applicable federal permits issued for the work including CNPA, SARS, DFO and other permits.
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.23 All applicable work plans.

1.17 Regulatory  
Requirements

- .1 While all projects on lands managed by Parks Canada must adhere to Federal laws and regulations, it is considered best practice to meet or exceed provincial or municipal laws, regulations and standards related to the environment if it can reduce the overall impact of the project.
- .2 Obtain and pay for Building Permit, Certificates, Licenses, and other permits required by regulatory municipal, provincial or federal authorities to complete the work.
- .3 The Prime Contractor and every sub-contractor is required to obtain and pay for a Pacific Rim National Park Reserve Business License. Business licenses are available from the Pacific Rim Park Reserve Administration building. Application for licenses shall apply a minimum of 4 weeks prior to arriving on site.
- .4 The Owner will issue a CNPA Permit to permit the Contractor to undertake required activities that normally violate the Canada National Parks Act and Regulations Act, such as tree removal, excavation, etc. No works shall proceed until the Contractor is in possession of the CNPA Permit.
- .5 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .6 Furnish inspection certificates in evidence that the work conforms to the requirements of the authority having jurisdiction.
- .7 Suitable habitat for the Dromedary Jumping-slug, is located within the Project area and the Project has a Species Act Risk Act-Compliant Authorization to reduce potential impact to the species. Contractor will need to coordinate with and follow advice from the OEM to avoid impacts to species at risk and their habitat. Refer to Section 01 35 43 – Environmental Procedures for further details.
- .8 The project site is located adjacent to the marine shoreline at Long Beach. It is a violation of the Fisheries Act to release deleterious substances to the marine environment that could cause harm to fish or fish habitat. While this work does not require a DFO permit, DFO regulations apply with regards to protecting the sensitive marine shoreline adjacent to the project site.

1.18 Contractor's Use  
of Site

Use of site:

- .1 Exclusive and complete for execution of the Trail Work within the cleared forest area of the work.
  - .2 Temporary access points to highway 4: Works shall be coordinated to create minimum disruption for highway users.
  - .4 Assume responsibilities for assigned premises for performance of this Work.
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- .5 Be responsible for coordination of all Work activities on site, including the Work of other contractors engaged by the DR.
    - .2 Access to the trail work site shall be by way of the proposed access points only. Creating additional access points is not permitted.
    - .3 Perform Work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
    - .4 Do not unreasonably encumber site with material or equipment.
    - .5 The Contractor shall park employee vehicles and equipment in existing parking areas or in those areas designated and approved by the DR. Vehicle parking within the highway ROW or any other road ROW is prohibited unless required to undertake the work and approved in advance by the DR. Where the Contractor requires vehicles or equipment to be parked within any road or highway ROW, the Contractor shall submit a parking plan request a minimum of ten days prior to the required parking for review and approval by the DR. The DR may request changes to any plan to ensure that proposed locations for parking are satisfactory for each Project site.
  - 1.19 Traffic Control
    - .1 Do not close any lanes of highway 4 without consulting DR. Contractor to keep one lane open all the time for alternating traffic. Contractor to submit a road closure plan to review by DR, Parks and Public works three weeks before the planned lane closures. Before impacting traffic erect suitable signs and devices in accordance with instructions contained in the Ministry of Transportation "Traffic Control Manual for Work on Roadways".
    - .2 The Contractor shall have prepared a Traffic Management Plan (TMP) by a person or company certified in this work. All lanes of traffic shall remain open during long weekends in June, July, August, and September due to heavy traffic usage in the Park Reserve.
    - .3 During lane closures the number of certified flag control personnel described in the TMP shall be used to direct traffic. Under normal operations and procedures vehicles shall not be delayed by more than 10 minutes by the work.
  - 1.20 Examination
    - .1 Examine the site and be familiar and conversant with existing conditions likely to affect work. It is strongly recommended that the Contractor becomes familiar with the terrain, access, weather, wetlands and expected ground conditions along the trail alignment prior to bidding the work.
    - .2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.
  - 1.21 Existing Services
    - .1 Location of utilities shown on the drawing are to be considered as approximate. The Contractor shall use standard methods to locate & protect existing utilities.
    - .2 Utilities are shown on specific sheets designated utilities. Contractor will be required to do these utility locations. Water main was installed with directional drilling, no trench line is visible.
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| 1.22 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 DR of impending installation and obtain DR's approval for actual location.  |
|   | .4 | Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the DR and/or as specified.  |
|   | .5 | For storing the construction equipment at night, Parks Canada may provide a location to create a secure compound upon discussion with them.  |
| 1.23 Cutting and Patching               | .1 | Cut existing surfaces only as required to accommodate new work and as directed by the DR.  |
|   | .2 | Remove items so shown or specified.  |
|   | .3 | Do not cut, bore, or sleeve load-bearing members unless instructed to do so by the drawings and/or specifications.   |
|   | .4 | Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.  |
|   | .5 | Fit work watertight to pipes, sleeves, ducts and conduits.   |
|   | .6 | Patch and make good surfaces cut, damaged or disturbed, to DR's approval. Match existing material, colour, finish and texture.   |
|   | .7 | Making good is defined as matching construction and finishing materials and the adjacent surfaces such that the difference between existing and new surfaces is less than 6 mm over a distance of 3.0 metres.  |
| 1.24 Setting Out Work                   | .1 | Assume full responsibility for and execute complete layout of work to lines dimensions, thicknesses, cross slopes, and tolerances indicated. Match into the previously constructed works. The Contractor shall lay out the work in the field to confirm the project design blends into the existing grades for both vertical and horizontal alignment. A string line shall be used to set out one side of the trail prior to paving to ensure a smooth horizontal alignment.   |
|   | .2 | Provide devices needed to layout and construct work and supply such devices as straight edges, templates, etc. required to facilitate DR's inspection of work.   |
|   | .3 | After clearing trees, brush, and other vegetation from the Work site and clear site lines are available the Contractor shall survey the existing slope in sufficient detail to provide the DR with an accurate digital terrain model in an AutoCAD format compatible to the existing design drawings. This shall be provided to the DR at least 2 weeks prior to the start of the earthworks to permit time to modify the design of the trail to fit into the existing contours more closely. A separate pay item is provided in the unit price table for this work. |
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- .4 Layout and survey works should be considered in the context of the construction sequencing and methodology plan that is to be prepared, submitted and managed throughout the project. (see clause 1.26 below and Section 01 33 00 Submittal Procedures)
  - 1.25 Quality of Work
    - .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
    - .2 The workmanship, erection methods, and procedures to meet minimum standards set out in the applicable codes and standards.
    - .3 In cases of dispute, decisions as to standard or quality of work rest solely with the DR, whose decision is final.
  - 1.26 Work Coordination
    - .1 Coordination of work with other Contractors:
      - .1 The Contractor shall coordinate the work of their crews and the crews of subtrades with other Contracts that are proceeding in the Park Reserve as to not delay or interfere with the work of other contractors. Where the work of another Contract is to match into this Contract work, the Contractor shall perform the Work such that it matches to other work. If it appears a conflict will arise between Contractors, notify the DR immediately.
      - .2 Deficiency work clean-up by previous trail Contractors.
      - .3 BC Hydro and Telus relocation of anchors and/or hydro poles.
    - .2 Coordinate work of subtrades:
      - .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.
    - .3 Coordinate work with Environmental, Archeology, and First Nations Monitors:
      - .1 This project is being carried out in a National Park Reserve which has strict requirements for the protection and preservation of environmental and archeological assets within the Park Reserve.
      - .2 The Owner shall employ and pay for the Owner's Environmental Monitor (OEM), an Archeological Monitor (AM), and First Nations Monitors at no cost to the Contractor. They will protect the assets of the Park Reserve during construction and will also provide information to the Contractor to assist with the Work. The OEM and AM will have the authority to stop the work if, in their opinion, continuing the Work will result in unacceptable damage to the Park Reserve assets.
      - .3 Attend regular morning start up tailgate meetings with the OEM to plan the day's work.
      - .4 The OEM will discuss with the Contractor of any concerns or special environmental measures that need to be taken within the area of work for the period covered.
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- .5 The Archeological Monitor will discuss with the Contractor of any concerns or special measures that need to be taken within the area of work for the period covered. The Contractor may be provided with confidential maps and plans of archeological assets in the Park Reserve that require special treatment or avoidance
  - .6 The Park Reserve is home to several Species at Risk (Dromedary Jumping Slug and others) which will require additional diligence on the part of the Contractor. The OEM and/or Qualified Environmental Professional will arrange for advance surveys depending on location, timing and type of work and salvage and removal of several species of amphibians from the alignment prior to the Contractor doing work in the area. The Contractor will need to coordinate their work to provide sufficient time for the survey and salvage operations to occur.
  - .4 This section of trail is being constructed in a geotechnically sensitive area with considerations of slope stability. All earthwork and retaining wall construction is to be coordinated with the Owner's Geotechnical Engineer.
  - .5 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
    - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
    - .2 Develop coordination drawings when required, illustrating potential interference between works of various trades and distribute to affected parties.
      - .1 Identify on coordination drawings, structural elements, services lines, rough-in points, and indicate location of services entrance to site.
    - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign-off on drawings.
    - .4 Publish minutes of each meeting.
    - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
    - .6 Submit copy of coordination drawings and meeting minutes to the DR for information purposes.
    - .7 Coordinate and plan for all necessary lane closures in advance.
  - .6 Submit shop drawings and order equipment and materials only after coordination meeting for these have taken place. Note that there is a requirement for a construction sequencing, schedule, and methodology plan prepared in co-operation with an independent geotechnical engineer prior to mobilization. See Submittals Section of specifications.
  - .7 Work cooperation:
    - .1 Ensure cooperation between trades in order to facilitate general progress
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- of Work and avoid situations of spatial interference.
- .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching, and removal or replacement of completed work.
  - .3 Ensure disputes between subcontractors are resolved.
  - .8 The Owner is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.
  - .9 Maintain efficient and continuous supervision.
- 1.27 Approval of Shop Drawings, Product Data and Samples
- .1 In accordance with Section 01 33 00 – Submittal Procedures, submit the requested shop drawings, product data, MSDS sheets, and samples indicated in each of the technical Sections.
  - .2 Allow sufficient time for the following:
    - .1 Review of product data.
    - .2 Approval of shop drawings.
    - .3 Review of re-submission.
    - .4 Ordering of approved material and/or products.
- 1.28 Archeological, Relics, Antiques, and Items of Cultural Significance
- .1 Pacific Rim National Park Reserve is home to a significant number of archeological sites and other sites of cultural interest. All works shall be carried out in accordance with Section 01 35 44 – Cultural Resource Procedures.
  - .2 The successful Contractor may be provided with confidential plans and drawings showing locations of areas of archeological and cultural interest. These plans shall remain the property of the Parks and be returned upon completion of the project. The Contractor will maintain confidentiality of these plans to protect the resources of the Park Reserve.
- 1.29 Species at Risk
- 1. Pacific Rim National Park Reserve is home to several listed species at risk and areas of critical habitat. The Contractor shall avoid contact or damage to at risk species or critical habitat to all reasonable extents possible. All works shall be carried out in accordance with Section 01 35 43 – Environmental Procedures.
  - 2. The Contractor shall be provided with confidential plans and drawings showing locations of areas of species at risk and other sensitive habitats in the project area. These plans shall remain the property of the Parks and be returned upon completion of the project. The Contractor will maintain confidentiality of these plans to protect the resources of the Park Reserve.
- 1.30 Owner's Environmental Monitor (OEM)
- .1 While the Contractor is responsible for supervising and coordinating their work, the Contractor will receive directions and instructions from the OEM with respect to all environmental issues. The OEM will be employed by the Owner. The OEM shall review and approve the Contractor's work plans and provide direction as to acceptable working methods and the mitigation measures require
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to comply with Section 01 35 43 - Environmental Procedures. The Owner is responsible for providing additional environmental monitors to support the OEM as deemed necessary by the OEM. The additional environmental monitors will work under the direction of the OEM to ensure sufficient monitoring is provided for each worksite. The Contractor will conduct their operations in an efficient manner to minimize the need for and time required by additional OEM's.

- 1.31 Project Meetings .1 DR will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
- 1.32 Testing and Inspections .1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the DR are specified in Section 01 45 00 – Quality Control.
- .2 The Contractor will appoint and pay for the services of testing agencies and/or testing laboratories to meet the requirements specified in the Contract documents and where required for the following:
- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed for Contractor's convenience.
- .3 Tests specified to be carried out under the DR's supervision.
- .3 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the DR may require to verify acceptability of corrected work.
- .4 Contractor shall notify DR in advance of planned testing.
- .5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by DR.
- .7 The DR may require, and pay for, additional inspection and testing services not included here.
- .8 Provide DR with 2 copies of testing laboratory reports and mill tests and certificates of compliance as soon as they are available.
- 1.33 As-Built Documents .1 The DR will provide the Contractor with 2 sets of drawings, 2 sets of specifications, and 2 copies of the AutoCAD files for "as-built" purposes.
- .2 As work progresses, Contractor is to maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings, and shop drawings as changes occur. At the end of the work Contractor is to supply the DR the records of the changes in the drawings and specifications to prepare as-built drawings.
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| 1.34 Cleaning                 | .1 | Conduct daily cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.   |
|                               | .2 | Ensure cleanup of the work areas each day after completion of work.   |
|                               | .3 | In preparation for final inspections:   |
|                               | .1 | The finished paved trail shall be shaped to the cross section specified, compacted to the specified density, and clear of debris and extraneous materials.  |
|                               | .2 | Remove and dispose of surplus construction materials.   |
|                               | .3 | All new road and parking surfaces, and existing road surfaces that were soiled by the Contractors activities, shall be broom clean.   |
|                               | .4 | Ensure all attachments on bridges, railings, gates, signs, and baffles disturbed by Contractor are tightened to industry standards.   |
|                               | .4 | Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.  |
| 1.35 Invasive Species         | .1 | The Contractor shall be diligent to avoid the introduction of invasive species of plants into the park and avoid moving invasive species already within the park to new locations. All works shall be carried out in accordance with Section 01 35 43 – Environmental Procedures.   |
| 1.36 Environmental Protection | .1 | The Project is within the boundaries of the Pacific Rim National Park Reserve, an area of significant ecological importance. As a result, stringent environmental controls will be placed on the works as described in Section 01 35 43 - Environmental Procedures. The Contractor shall be in full compliance with the contract environmental procedures, all regulatory approval terms and conditions and all applicable environmental legislation at all times throughout the duration of the contract, including during any shutdown periods. |
| 1.37 Additional Drawings      | .1 | The DR may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the Contract documents.   |
|                               | .2 | Upon request, the DR may furnish up to a maximum of 2 full size sets and 6 tabloid size sets of Contract drawings and 2 sets of documents for use by the Contractor at no additional cost. Should sets of drawings or documents be required the DR will provide them at additional cost. An electronic copy will be provided at time of Award.  |
| 1.38 Additional Information   | .1 | A geotechnical assessment report prepared by WSP Canada Inc. dated February 2021 is provided for reference purposes only.   |
| 1.39 System of Measurement    | .1 | The metric system of measurement (SI) will be employed on this Contract. All survey and co-ordination data are in the NAD 83 coordinate system except where local survey coordinates and elevations were used for detail plans of isolated areas of the project.  |
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**PART 1 - GENERAL**

- 1.1 Description .1 Mobilization and Demobilization consists of those items not specifically defined and paid for at the unit rates contained in the Unit Price Table.
- .2 Included within this item are the insurance, bonding, and permits, the necessary Work and operations to complete the project including, but not limited to, the movement to and from the project site of personnel, equipment, supplies, and incidentals to the Site, the establishment of offices, camps, temporary utilities, barriers, and enclosures, and other facilities necessary to undertake the Work, project management, reporting, health and safety, cleaning, waste management, closeout procedures, and all other Work Items and operations which must be initiated and finished as part of completion of the Work.
- .3 Contractor should not mobilize until a construction sequencing, methodology, and schedule is approved by the DR.
- 1.2 Measurement for Payment .1 The lump sum price tendered for Mobilization and Demobilization shall be full compensation for those items not included within other payment items.
- .2 The lump sum price tendered for Mobilization and Demobilization shall not exceed 10% of the total price tendered for the Work. Costs in excess of 10% of the total tendered price shall be included in other contract items.
- .3 Payment for Mobilization and Demobilization shall be made at the lump sum price tendered. Payment shall be distributed as follows: 50% in the first Progress Payment and 50% when Substantial Completion is achieved.
- .4 For the Contractor's first Progress Payment, it is a condition precedent to the Owner's obligation (paragraph 3 of GC5.4) that the Contractor has provided all necessary documentation required by the Contract for the first Progress Payment.
- .5 The payments from the Lump Sum Price, as set out above, will be full compensation for mobilization, demobilization and re-mobilization, regardless of the number of times the Contractor mobilizes.

**END OF SECTION**

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- 1.40 Measurement for .1  
Payment
- The Contractor shall make and record all measurements for payment. Methods for measurement shall be reviewed and accepted by the DR before the start of work for each item and area. The measured quantities are not final until accepted by the DR. The DR reserves the right to make independent measurements and calculations to verify or use in place of the Contractor's measurements for purposes of payment.
- 1.41 Familiarization .1  
with Site
- Before submitting tender, it is recommended to visit the site to become familiar with all conditions likely to affect the cost of the Work. It should be noted that the location of the Work site has high annual rainfall, exceeding 3,000 mm with most precipitation between October and April. This will significantly impact the Contractor's work efficiency during those months. The environmental mitigation measures required for working in a National Park Reserve are stringent and the Contractor should review Section 01 35 43 - Environmental Procedures, in detail to understand the impact these measures may have on the cost of the Work. Weather shutdowns are determined based on the potential environmental impact and are at the discretion of the OEM irrespective of precipitation amount. Additional weather-related information can be found on the Government of Canada web site at:
- [http://climate.weather.gc.ca/climate\\_normals/results\\_1981\\_2010\\_e.html?searchType=stnName&txtStationName=tofino&searchMethod=contains&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=277&dispBack=1](http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnName&txtStationName=tofino&searchMethod=contains&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=277&dispBack=1)
- 1.42 Submission of .1  
Bid
- Submission of a bid is deemed to be confirmation of the fact that the Bidder has analyzed the Contract documents and is fully conversant with all conditions therein.
- .2
- The environmental and archeology requirements for successfully working in Pacific Rim National Park Reserve are extensive and may have a considerable impact on the costs to complete the tendered works successfully. It is strongly recommended that prospective Bidders review and understand the environmental requirements which have implications for work planning, methods, scheduling, and coordination with Government Representatives.
- 1.43 Working Hours .1
- Hours of work shall be limited to 8:00 am until 6:00 pm, unless written permission is granted by the DR for specific time slots. Night work using lights is not permitted due to negative effects on wildlife. As per Specification 01 35 00, Clause 1.9.3, lane closures on roads are not permitted on long weekends between May and September. Weekend work is permitted.

**END OF SECTION**

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**PART 1 - GENERAL**

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| 1.1 Section Includes                                    | .1  | Coordination of Work with work by others under administration of DR.   |
|   | .2  | Scheduled preconstruction and progress meetings.   |
| 1.2 Description   | .1  | Coordination of progress schedules, submittals, use of sites, temporary utilities, construction facilities, and construction Work, with progress of work by others under instructions of DR. |
| 1.3 Construction Progress Meetings and Project Meetings | .1  | The DR will schedule and administer project meetings as deemed necessary throughout progress of the Work.  |
|   | .2  | Agenda to include, but not limited to, the following:  |
|   | .1  | Review and approval of minutes of previous meeting.  |
|   | .2  | Review of site safety and security issues.   |
|   | .3  | Review of Work progress since previous meeting.  |
|   | .4  | Field observations, problems, conflicts.   |
|   | .5  | Problems that impede construction schedule.  |
|   | .6  | Review of materials delivery schedules.  |
|   | .7  | Review of environmental measures, incidences, near misses, and performance.  |
|   | .8  | Review of archeological issues.  |
|   | .9  | Corrective measures and procedures to regain projected schedule.   |
|   | .10 | Revision to construction schedule if required.   |
|   | .11 | Progress schedule, during succeeding work period.  |
|   | .12 | Review submittal schedules: expedite as required.  |
|   | .13 | Proposed list of suppliers and any sub-contractors.  |
|   | .14 | Maintenance of quality standards.  |
|   | .15 | Review proposed changes for affect on construction schedule and on completion date.  |
|   | .16 | Other business.  |
|   | .17 | Schedule next meeting.   |
|   | .3  | The Contractor shall provide physical space or a virtual video-conference platform, as per current provincial health guidelines, and make arrangements for meetings.                         |
|   | .4  | The DR will record minutes, including significant proceedings and decisions, identify action by parties, and set time and date for next progress meeting.                                    |
|   | .5  | The DR will reproduce and distribute copies of minutes within three days after each meeting and transmit to meeting participants, affected parties not in attendance, and Contractor.        |
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- 1.4 Construction Organization and Start-up
- .1 Within 5 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
  - .2 DR and senior representatives of the Contractor, major Subcontractors (if applicable), environmental and archeological monitors, field inspectors and supervisors will be in attendance.
  - .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
  - .4 Agenda to include, but not limited to, the following:
    - .1 Appointment of official representative of participants in Work.
    - .2 Schedule of Work, progress scheduling in accordance with Section 01 32 17 - Construction Progress and Reporting. This is to include construction sequencing / methodology submittal.
    - .3 Requirements for and Schedule of submission of shop drawings, samples, etc. in accordance with Section 01 33 00 - Submittal Procedures.
    - .4 Requirements for temporary facilities, storage sheds, utilities, etc. in accordance with Section 01 51 00 - Temporary Utilities.
    - .5 Delivery schedule of specified equipment in accordance with Section 01 32 17 - Construction Progress and Reporting.
    - .6 Site security in accordance with Section 01 52 00 - Construction Facilities.
    - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
    - .8 Take-over procedures, acceptance, and warranties in accordance with Section 01 78 00 - Closeout Procedures and Submittals.
    - .9 Monthly progress claims, administrative procedures, photographs, and holdbacks.
    - .10 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00 - Quality Control.
    - .11 Insurances and transcript of policies.
    - .12 Environmental concerns, environmental windows for work, cast-in-place concrete in parks, amphibian protection, wildlife issues, etc.
    - .13 Other business.
  - .5 Comply with DR's allocation of mobilization areas of sites; for field offices and sheds, construction camp(s) and camp utilities, access, traffic, and parking facilities.
  - .6 During construction, coordinate use of sites and facilities with DR.
  - .7 Comply with instructions of DR for use of temporary utilities and construction facilities.
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- 1.5 On-Site Documents .1 Maintain one copy each of the following at the job site:
- .1 Contract drawings.
  - .2 Contract specifications.
  - .3 Addenda to Contract documents.
  - .4 Copy of approved work schedule, including construction sequencing / methodology.
  - .5 Reviewed/approved shop drawings.
  - .6 Change orders.
  - .7 Other modifications to Contract.
  - .8 Field test reports.
  - .9 Reviewed/approved samples.
  - .10 Manufacturers' installation and application instructions.
  - .11 One set of record drawings and specifications for "as-built" purposes.
  - .12 Current construction standards of workmanship listed in technical sections.
  - .13 Project Safety Plan / Traffic Control Plan.
  - .14 Copy of approved Work schedule.
  - .15 Labour conditions and wage schedules.
  - .16 Pacific Rim National Park Business License.
  - .17 Section 01 35 43- Environmental Procedures.
  - .18 Environmental Management Plan (To be issued upon award).
  - .19 Environmental Report and Drawings (Confidential, to be secured).
- 1.6 Schedules .1 Submit preliminary construction progress schedule in accordance with Section 01 32 17 - Construction Progress and Reporting to DR coordinated with DR's project schedule.
- .2 After review, revise and resubmit schedule to comply with revised project schedule.
  - .3 During progress of Work revise and resubmit as directed by DR.
- 1.7 Submittals .1 Submit preliminary shop drawings and product data and samples in accordance with Section 01 33 00 – Submittal Procedures, for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to DR.
- .2 Submit requests for payment for review, and for transmittal to DR.
  - .3 Submit requests for interpretation of Contract Documents, and obtain instructions through DR.
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|                         | .4 | Process substitutions through DR.   |
|                         | .5 | Process change orders through DR.   |
|                         | .6 | Deliver closeout submittals for review and preliminary inspections in accordance with 01 78 00 - Closeout Procedures and Submittals, for transmittal to DR. |
| 1.8 Closeout Procedures | .1 | Notify DR in accordance with Section 01 78 00 – Closeout Procedures and Submittals.   |
|                         | .2 | Accompany DR on preliminary inspection to determine items listed for completion or correction.  |
|                         | .3 | Comply with DR's instructions for correction of items of Work listed in executed certificate of Substantial Performance.                                    |
|                         | .4 | Notify DR of instructions for completion of items of Work determined in DR's final inspection.  |

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes .1 Schedule, form, and content.  
.2 Staged construction.  
.3 Scheduled revisions.  
.4 Critical path scheduling.
- 1.2 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 Actual Finish Date (AF): point in time that Work actually ended on activity.  
.3 Actual Start Date (AS): point in time that Work actually started on activity.  
.4 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.  
.5 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.  
.6 Completion Milestones: they are firstly Substantial Completion and secondly Final Certificate.  
.7 Constraint: applicable restriction that will affect performance of Project. Factors that affect activities can be scheduled.  
.8 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.  
.9 Critical Activity: any activity on a critical path. Most commonly determined by using critical path method.  
.10 Critical Path: series of activities that determines duration of Project. In deterministic model, critical path is usually defined as those activities with float less than or equal to specified value, often zero. It is longest path through Project.  
.11 Critical Path Method (CPM): network analysis technique used to predict Project duration by analyzing which sequence of activities (which path) has least amount of scheduling flexibility (least amount of float).  
.12 Data Date (DD): date at which, or up to which, Project's reporting system has provided actual status and accomplishments.  
.13 Duration (DU): number of work periods (not including holidays or other non-working periods) required to complete activity or another Project element. Usually expressed as workdays or work weeks.  
.14 Early Finish Date (EF): in critical path method, earliest possible point in time on
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which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints. Early finish dates can change as Project progresses and changes are made to Project plan.

- .15 Early Start Date (ES): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints. Early start dates can change as Project progresses and changes are made to Project Plan.
  - .16 Finish Date: point in time associated with activity's completion. Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.
  - .17 Float: amount of time that activity may be delayed from its early start without delaying Project finish date. Float is mathematical calculation and can change as Project progresses and changes are made to Project plan. This resource is available to both Parks Canada and Contractor.
  - .18 Lag: modification of logical relationship that directs delay in successor task.
  - .19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).
  - .20 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).
  - .21 Lead: modification of logical relationship that allows acceleration of successor task.
  - .22 Logic Diagram: see Project network diagram.
  - .23 Master Plan: summary-level schedule that identifies major activities and key milestones.
  - .24 Milestone: significant event in Project, usually completion of major deliverable.
  - .25 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.
  - .26 Near-Critical Activity: activity that has low total float.
  - .27 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.
  - .28 Project Control System: fully computerized system utilizing commercially available software packages.
  - .29 Project Network Diagram: schematic display of logical relationships of Project activities. Always drawn from left to right to reflect Project chronology.
  - .30 Project Plan: formal, approved document used to guide both Project execution and Project control. Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines. Project plan may be
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summary or detailed.

- .31 Project Planning: development and maintenance of Project Plan.
- .32 Project Planning, Monitoring, and Control System: overall system operated by Departmental Representative to enable monitoring of Project Work in relation to established milestones.
- .33 Project Schedule: planned dates for performing activities and 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.
- .34 Quantified Days Duration: working days based on 5-day work week, discounting statutory holidays.
- .35 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
- .36 Scheduled Finish Date (SF): point in time that Work was scheduled to finish on activity. Scheduled finish date is normally within range of dates delimited by early finish date and late finish date.
- .37 Scheduled Start Date (SS): point in time that Work was scheduled to start on activity. Scheduled start date is normally within range of dates delimited by early start date and late start date.
- .38 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
- .39 Work Breakdown Structure (WBS): deliverable-oriented grouping of project elements that organizes and defines total Work scope of Project. Each descending level represents increasingly detailed definition of Project Work.

### 1.3 System Description

- .1 Construction Progress Schedule (Project Time Management): describes processes required to ensure timely completion of Project. These processes ensure that various elements of Project are properly coordinated. It consists of planning, time estimating, scheduling, progress monitoring, and control.
  - .2 Planning: this is most basic function of management, that of determining presentation of action, and is essential.
    - .1 It involves focusing on objective consideration of future, and integrating forward thinking with analysis; therefore, in planning, implicit assumptions are made about future so that action can be taken today.
    - .2 Planning and scheduling facilitates accomplishment of objectives and should be considered continuous interactive process involving planning, review, scheduling, analysis, monitoring and reporting.
  - .3 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made. This implies
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progressively more reliability of scheduling data. Detail Project schedule is used for analysis and progress monitoring.

- .4 Ensure project schedule efficiencies through monitoring.
  - .1 When activities begin on time and are performed according to estimated durations without interruptions, original Critical Path will remain accurate. Changes and delays will however, create an essential need for continual monitoring of Project activities.
  - .2 Monitor progress of Project in detail to ensure integrity of Critical Path by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
  - .3 Monitoring should be done sufficiently often so that causes of delays are immediately identified and removed if possible.
- .5 Project monitoring and reporting: as Project progresses, keep team aware of changes to schedule, and possible consequences. In addition to Bar Charts and CPM networks, use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.
- .6 Narrative reporting begins with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

#### 1.4 CPM Requirements

- .1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.
  - .2 Extent of environmental windows shall be shown on the schedule and accounted for. Restrictive windows include the bird nesting season (March 12<sup>th</sup> to August 17<sup>th</sup>), fisheries restriction windows (June 15<sup>th</sup> or August 15<sup>th</sup>, depending upon the stream and fish species, to September 15<sup>th</sup>), and amphibian windows (variable with dry weather (August), migrations, etc.) Refer to Section 01 35 43 – Environmental Procedures for full details of environmental windows.
  - .3 Master Plan and Detail Schedule deemed impractical by DR are revised and resubmitted for approval.
  - .4 Acceptance of Master Plan and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract. Duration of Contract may only be changed through bilateral Agreement.
  - .5 Consider Master Plan and Detail Schedule deemed practical by DR, showing Work completed in less than specified Contract duration, to have float & rain days.
  - .6 First Milestone on Master Plan and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.
  - .7 Calculate dates for completion milestones from Plan and Schedule using
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specified time periods for Contract.

- .8 Substantial Completion with "LF" constraint equal to calculated date.
- .9 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.
- .10 Delays to non-critical activities, those with float may not be basis for time extension.
- .11 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates other than required by Contract.
- .12 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated. Specified Contract duration has been predicated assuming normal amount of adverse weather conditions. Refer to Section 01 35 43- Environmental Procedures for further information on the extreme weather conditions encountered in the Park Reserve, which need to be considered by the Contractor when developing the Master Plan and Detail Schedule.
- .13 Allow for traffic lane closure restrictions, no lane closures on long weekends from May through September.
- .14 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration. Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.
- .15 Arrange participation on and off site of subcontractors and suppliers, as required by DR, for purpose of network planning, scheduling, updating and progress monitoring. Approvals by DR of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.
- .16 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this Contract.

#### 1.5 Submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit to DR Project Control System for planning, scheduling, monitoring, and reporting of project progress.
  - .3 Submit Project Control System to DR for approval; failure to comply with each required submission, may result in payment being withheld.
  - .4 Include costs for execution, preparation, and reproduction of schedule submittals in bid documents.
  - .5 Submit letter ensuring that schedule has been prepared in coordination with major Subcontractors, if applicable.
  - .6 Submit Project planning, monitoring, and control system data as required by DR in following form:
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- .1 CD files in original scheduling software and PDF formats containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.
  - .2 Master Plan Bar Chart.
  - .3 Construction Detail Schedule Bar Chart.
  - .4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.
  - .5 Criticality report listing activities and milestones with up to 5 days total float used as first sort for ready identification of critical or near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.
  - .6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.
  - .7 Within 2 weeks after Contract award, every 2 weeks thereafter during performance of the Contract, and within 2 weeks after final completion of the Work, provide to DR:
    - .1 Statement of total person days of labour used on site in performance of Contract, including labour provided under subcontracts.
    - .2 Estimate of total value in dollars of material delivered to site and installed, including material provided and installed under subcontracts.
- 1.6 Quality Assurance .1 Use experienced personnel, fully qualified in planning and scheduling, to provide services from start of construction to Final Certificate, including Commissioning.
- 1.7 Project Meeting .1 Request to meet with DR within 5 working days of Award of Contract date, to establish Work requirements and approach to project construction operations.
- 1.8 Work Breakdown Structure .1 Prepare construction WBS within 15 working days of Award of Contract date. Develop WBS through at least five levels: project, stage, element, sub-element and work package.
- 1.9 Project Milestones .1 Project milestones form targets for both Master Plan and Detail Schedule of CPM construction network system. Include:
-

- .1 Submittal of construction sequencing / methodology plan
  - .2 Mobilization
  - .3 Setup of site and utility connections
  - .4 Crushing of granular materials.
  - .5 Excavation and fill work.
  - .5 Retaining walls and railings.
  - .6 Granular sub base and base.
  - .7 Paving start and completion.
  - .8 Pavement marking and signage.
  - .9 Landscaping.
  - .10 Completion of shoulder work.
  - .11 Substantial Completion Certificate.
- 1.10 Master Plan
- .1 Structure and base CPM construction networks system on WBS coding to ensure consistency throughout Project.
  - .2 Prepare comprehensive construction Master Plan (CPM logic diagram) and dependent Cash Flow Projection within 15 working days of finalizing Agreement to confirm validity or alternates of identified milestones.
    - .1 Master Plan will be used as baseline.
      - .1 Revise baseline as conditions dictate and as required by DR.
      - .2 DR will review and return revised baseline within 10 work days.
  - .3 Reconcile revisions to Master Plan and Cash Flow Projections with previous baseline to provide continuous audit trail.
  - .4 Initial and subsequent Master Plans will include:
    - .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
    - .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
    - .3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.
    - .4 Actual/projected monthly cash flow: expressed monthly and shown in both graphical and numerical form.
- 1.11 Detail Schedule
- .1 Structure and base CPM construction networks system on WBS coding to ensure consistency throughout Project.
  - .2 Prepare comprehensive construction Master Plan (CPM logic diagram) and
-

dependent Cash Flow Projection within 15 working days of finalizing Agreement to confirm validity or alternates of identified milestones.

- .1 Master Plan will be used as baseline.
    - .1 Revise baseline as conditions dictate and as required by DR.
    - .2 DR will review and return revised baseline within 10 work days.
  - .3 Reconcile revisions to Master Plan and Cash Flow Projections with previous baseline to provide continuous audit trail.
  - .4 Initial and subsequent Master Plans will include:
    - .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
    - .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
    - .3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.
    - .4 Actual/projected cash flow: expressed monthly and shown in both graphical and numerical form.
  - .5 Provide detailed project schedule (CPM logic diagram) within 15 working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:
    - .1 Shop drawings.
    - .2 Samples.
    - .3 Approvals.
    - .4 Procurement.
    - .5 Construction.
    - .6 Installation.
    - .7 Site works.
    - .8 Testing.
    - .9 Shutdown or closure activity.
    - .10 Commissioning and acceptance.
  - .6 Detail CPM schedule to cover in detail minimum period of 6 months beginning from Award of Contract date with each activity duration about 3 to 15 days.
    - .1 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.
    - .2 Detail activities completely and comprehensively throughout duration of project.
  - .7 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Plan.
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- .8 Clearly show sequence and interdependence of construction activities and indicate:
    - .1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
    - .2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:
      - .1 Time for submittals, resubmittals and review.
      - .2 Time for fabrication and delivery of manufactured products for Work.
      - .3 Interdependence of procurement and construction activities.
    - .3 Include sufficient detail to assure adequate planning and execution of Work. Activities should generally range in duration from 3 to 15 workdays each.
  - .9 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.
  - .10 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.
  - .11 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to DR for review effects created by insertion of new Change Order.
  - 1.12 Review of the Construction Detail Schedule
    - .1 Allow 10 work days for review by DR of proposed construction Detail Schedule.
    - .2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to DR for review within 5 work days.
    - .3 Promptly provide additional information to validate practicability of Detail Schedule as required by DR.
    - .4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.
  - 1.13 Compliance with Detail Schedule
    - .1 Comply with reviewed Detail Schedule.
    - .2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after receipt of approval by DR.
    - .3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
      - .1 Corrective measures may include:
        - .1 Increase of personnel on site for effected activities or work
-

- package.
  - .2 Increase in materials and equipment.
  - .3 Overtime work and additional work shifts.
  - .4 Submit to DR, justification, project schedule data, and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:
    - .1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.
    - .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.
    - .3 Other supporting evidence requested by DR.
    - .4 Do not assume approval of Contract extension prior to receipt of written approval from DR.
  - .5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.
    - .1 DR will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.
    - .2 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.
- 1.14 Process Monitoring and Reporting
- .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating, and progress monitoring. Inspect Work with DR at least once per Project to establish progress on each current activity shown on applicable networks.
  - .2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
  - .3 Perform Detail Schedule update at least once per Project with status dated (Data Date). Update to reflect activities completed to date, activities in progress, logic and duration changes.
  - .4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
  - .5 Submit to DR copies of updated Detail Schedule.
  - .6 Requirements for progress monitoring and reporting are basis for progress payment request.
  - .7 Submit written report at least once per Project based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting
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current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:

- .1 Description of progress made.
- .2 Pending items and status of: permits, shop drawings, Change Orders, possible time extensions.
- .3 Status of Contract completion date and milestones.
- .4 Current and anticipated problem areas, potential delays and corrective measures.
- .5 Review of progress and status of Critical Path activities.

#### 1.15 Progress Photographs

- .1 Provide digital photos with dates and descriptions on CD disk with progress reports. Relate dates and descriptions to photo file names in separate text file CD.
- .2 Number of photographs: minimum of 10 photos per work at each major work site and typical photos of each phase of work.
- .3 Viewpoints: determined by DR.
- .4 Frequency: with progress statement, at completion of each construction stage, and as directed by DR.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes .1 This section includes but is not limited to the following:
- .1 Shop drawings.
  - .2 Product data.
  - .3 Samples.
  - .4 Waste Management Work Plan.
  - .5 Various Work Plans identified in the Environmental Procedures and other specifications.
  - .6 Traffic Management Plan.
  - .7 Health and Safety Plan.
  - .8 Certificates and Transcripts.
  - .9 Quality Testing Reports.
  - .10 Warranties.
  - .11 Quality Control Plan.
  - .12 Temporary shoring and support to complete Work where and when required.
  - .13 Construction Sequencing, Schedule, and Methodology Plan
- 1.2 Administrative .1 Submit to DR submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed 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 may be acceptable upon DR's approval.
  - .5 Review submittals prior to submission to DR. This review represents that necessary requirements have or will be determined & verified & each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated, and identified as to specific project will be returned without being examined and shall be considered rejected.
  - .6 Notify DR, 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 coordinated. It is recommended that Contractor become familiar with all site conditions likely to affect the cost of the Work before submission of their Tender documents.
  - .8 Contractor's responsibility for errors and omissions in submission is not relieved
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by DR's review of submittals.

- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by DR review.
- .10 Keep one reviewed copy of each submission on site.

### 1.3 Shop Drawings and Product Data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by the Contractor to illustrate details of a portion of Work.
  - .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
  - .3 Each shop drawing submitted that involves the provision of engineering design to bear signature and stamp of qualified professional engineer registered or licensed in province of British Columbia, Canada. These include but are not limited to:
    - .1 Falsework and/or shoring. It is the Contractor's responsibility to ensure that the structure is adequately braced at all times during the performance of the Contract, if and when necessary, especially during transporting and erection.
    - .2 Construction Sequencing and Methodology Plan (CSMP). Contractor to engage the services of an independent geotechnical engineer for the temporary excavation stability aspects of the plan. The plan is to be stamped by a geotechnical engineer
  - .4 Allow 10 working days for DR's review of each submission. For environmental submissions refer to clause 1.8 – Environmental Procedures, of this specification.
  - .5 Adjustments made on shop drawings by DR are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to DR prior to proceeding with Work.
  - .6 Make changes in shop drawings as DR may require, consistent with Contract Documents. When resubmitting, notify DR in writing of any revisions other than those requested.
  - .7 Accompany submissions with transmittal letter, in duplicate, containing:
    - .1 Date.
    - .2 Project title and number.
    - .3 Contractor's name and address.
    - .4 Identification and quantity of each shop drawing, product data, sample, etc.
    - .5 Other pertinent data.
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- .8 Submissions shall include:
    - .1 Date and revision dates.
    - .2 Project title and number.
    - .3 Name and address of:
      - .1 Subcontractor.
      - .2 Supplier.
      - .3 Manufacturer.
    - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents.
    - .5 Details of appropriate portions of Work as applicable:
      - .1 Fabrication.
      - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
      - .3 Setting or erection details.
      - .4 Capacities.
      - .5 Performance characteristics.
      - .6 Standards.
      - .7 Operating weight.
      - .8 Wiring diagrams.
      - .9 Single line and schematic diagrams.
      - .10 Relationship to adjacent work.
  - .9 After DR's review, distribute copies.
  - .10 Submit originals and an electronic copy on CD of shop drawings for each requirement in specification Sections and as DR may reasonably request.
  - .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification sections and as requested by DR where shop drawings will not be prepared due to standardized manufacture of product.
  - .12 Delete information not applicable to project.
  - .13 Supplement standard information to provide details applicable to project.
  - .14 If upon review by DR, no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
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- .15 The review of shop drawings by DR is for sole purpose of ascertaining conformance with general concept. This review shall not mean that DR 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 all requirements of construction and Contract Documents. 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 all sub-trades.
- 1.4 Progress Photographs .1 Submit progress photographs in accordance with Section 01 32 17 - Construction Progress and Reporting.
- 1.5 Quality Testing Reports .1 Certified quality testing reports and progress reports to be submitted to the DR directly from the testing agency as the tests are completed.
- 1.6 Quality Control Plan .1 Prepare and submit to DR for review and approval a Quality Control Plan including but not limited to:
- .1 Quality control processes and procedures.
  - .2 Quality control reporting and frequency.
  - .3 Testing agencies employed to provide materials testing.
  - .4 Frequency and types of testing.
  - .5 Verification of materials and installation procedures.
- 1.7 Construction Sequencing / Methodology Plan .1 Prepare and submit to DR for review and acceptance, a Construction Sequencing and Methodology Plan including but not limited to:
- .1 Schedule indicating the general sequence of work in relation to the later of the contractually approved start date or approval of plan. This is to include the time between tender award and start of field work. Allow a minimum of 5 working days for each submittal review.
- The following generalized sequence of events is anticipated:
- 1. Contract Award;
  - 2. On-site meeting with Owner's team, Contractor, and Contractor's Geotechnical Engineer;
  - 3. Submittal of a detailed construction sequencing and methodology plan, including stamped letter from geotechnical engineer;
  - 4. Owner Review of Submittal;
  - 5. On-site meeting to review and discuss specifics of the plan, potentially supplemented with one or more conference calls as necessary;
  - 6. Resubmittals and follow up reviews, as needed;
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7. Acceptance from DR; and,

8. Mobilization and Start of Construction.

.2 Construction sequencing that considers restrictions on access to parts of the slope with sufficient detail to demonstrate that the reach of equipment, temporary excavation slope stability, worker safety, environmental aspects, archeological reviews, protection of vegetation that is to remain, and surface restoration (including the ability to place woody debris and organics) have been considered. Include commentary on equipment routing and granular material product storage.

.3 Clear description of anticipated temporary excavation configurations and temporary stability measures to be implemented. The plan is to provide specific comment for work at the toe of the slope, in the buttress area, mid-slope trail construction, and remediation of the slide area. Also provide commentary on how seepage is to be managed (if encountered).

.4 The plan shall acknowledge that it protects all Veteran Class Trees (>1 m diameter) and other smaller diameter trees that are designated for retaining shown on the construction drawings.

.5 Details on subgrade protection from construction induced damage and environmental factors. Specific comment is to be included on the area of slope above Wall 5 where uncontrolled work could adversely affect long term slope stability.

.11 Temporary barrier layout and warning sign verbiage to keep public out and workers advised.

.2 Engage services of qualified Professional Engineer who is registered or licensed in Province of British Columbia, Canada in which Work is to be carried out to be responsible for the temporary excavation stability aspects of the plan.

.3 Each submittal is to include an updated, stamped document indicating that the geotechnical engineer is aware of and is in agreement with the proposed updates as they relate to temporary excavation stability.

.4 Accepted plan is to be in place a minimum of one week prior to equipment mobilization.

#### 1.8 Environmental Procedures

.1 Due to the complexity of the review for environmental procedures and the need for approvals and permits the review time required for these procedures is provided in the appropriate sections in these specifications.

**END OF SECTION**

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**PART 1 - GENERAL**

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|-----------------------------|---|
| 1.1 Section Includes        | <ul style="list-style-type: none"><li>.1 Informational and Warning Devices.</li><li>.2 Protection and Control of Public Traffic.</li><li>.3 Operational Requirements.</li></ul>   |
| 1.2 Description             | <ul style="list-style-type: none"><li>.1 Provide a detailed Traffic Management Plan (TMP) with a dedicated traffic control and pedestrian delineation for safety of motorists, pedestrians, and bicycle traffic for all locations where roadways and parking lots are affected by construction activities. Transportation of oversize material and oversize equipment outside of the Park Reserve boundary will require permits from the BC Ministry of Transportation and Infrastructure. Obtaining and costs for permits shall be the Contractors responsibility.</li><li>.2 The TMP shall be prepared in accordance with the BC Ministry of Transportation and Infrastructure “Management Manual for Work on Roadways” latest edition, and the “Standard Specifications for Highway Construction” latest edition.</li><li>.3 Provide all traffic delay and traffic control signage for the project.</li><li>.4 The plan shall be submitted to the DR and Park Reserve Administration for approval.</li><li>.5 The Contractor shall notify the DR and Park Reserve Administration and submit the TMP 3 weeks in advance of any lane or road closures.</li><li>.6 The transportation of oversize components may require special permits from the Ministry of Transportation and Infrastructure. It is the responsibility of the Contractor to make arrangements for all permits and associated costs and include these in the prices tendered for these items.</li></ul> |
| 1.3 Special Provisions      | <ul style="list-style-type: none"><li>.1 One lane of traffic shall be maintained at all times.</li><li>.2 Delays to traffic shall not exceed ten minutes in duration.</li></ul>   |
| 1.4 Measurement for Payment | <ul style="list-style-type: none"><li>.1 The lump sum price tendered for this item shall be full compensation for developing and implementing the TMP including flagging personnel, signs, cones, flashers, control vehicles, temporary markings and associated work.</li><li>.2 Payment for special procedures for traffic control and accommodation shall be made at the lump sum price tendered. Payment shall be distributed as follows: 25% in the first Progress Payment, 50% equal distribution in intermediate Progress Payments, and 25% when Substantial Completion is achieved.</li></ul>  |
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- .3 For the Contractor's first Progress Payment, it is a condition precedent to the Owner's obligation (paragraph 3 of GC5.4) that the Contractor has provided all necessary documentation required by the Contract for the first Progress Payment.
  - 1.5 References
    - .1 "Traffic Control Manual for Work on Roadways" (Province of British Columbia, Ministry of Transportation and Infrastructure).
    - .2 "Standard Specifications for Highway Construction" latest edition. (Province of British Columbia, Ministry of Transportation and Infrastructure).
  - 1.6 Protection of Public Traffic
    - .1 Comply with current requirements of Acts, Regulations, and By-Laws 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 traveled way:
      - .1 Position equipment to present 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 traveled way.
      - .3 Do not leave equipment on traveled way overnight.
    - .3 Do not close any lanes of road or highway without consulting DR. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in "Traffic Control Manual for Work on Roadways".
    - .4 Keep traveled way graded, free of pot-holes, and of sufficient width for required number of lanes of traffic.
    - .5 Contractor shall be required to control traffic if required to fall timber within distances of roads, parking areas, or paths as specified by WorkSafe BC. A previous contract has cleared the trail right of way of large trees and vegetation, if additional clearing and traffic control to accommodate clearing is required it will be paid as additional work.
  - 1.7 Informational and Warning Devices
    - .1 Provide, erect, and maintain signs, flashing warning lights, delineators, barricades, traffic cones, and other devices required to indicate construction activities and other temporary and unusual conditions resulting from Project Work that requires road user response as specified in "Traffic Control Manual for Work on Roadways".
    - .2 All traffic and warning signs shall be bilingual with English and French of equal size and elevation, English on the left and French on the right. Assistance in translation of signs may be obtained through the DR.
    - .3 Place signs and other devices in locations recommended in "Traffic Control Manual for Work on Roadways".
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- .4 Meet with DR prior to commencement of Work to prepare list of signs and other devices required for project.
  - .5 Continually maintain traffic control devices in use by:
    - .1 Checking signs daily for legibility, damage, suitability, and location. Clean, repair, or replace to ensure clarity and reflectance.
    - .2 Removing or covering signs which do not apply to conditions existing from day to day.
  - .6 Provide 70 cm to 90 cm high traffic cones as specified in “Traffic Control Manual for Work on Roadways”. Provide minimum 100 cones for site use.
  - .7 Ensure that necessary traffic cones and signs are in place prior to interference with traffic on existing roadways.
- 1.8 Control of Public Traffic
- .1 Provide traffic control in accordance with “Traffic Control Manual for Work on Roadways”. Ensure a current copy of manual is always available on site.
  - .2 Flagpersons:
    - .1 Provide trained, competent flagpersons with proof of certification from recognized training program on traffic control procedures through construction zones.
    - .2 Ensure flagpersons have proper equipment and clothing as specified in “Traffic Control Manual for Work on Roadways”.
    - .3 Flagpersons are required in the following (but not limited to) situations:
      - .1 When public traffic is required to pass working vehicles or equipment that block all or part of traveled roadway.
      - .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high, and traffic signal system is not in use.
      - .3 When workers or equipment are employed on traveled way over brow of hills, around sharp curves, or at other locations where oncoming traffic would not otherwise have adequate warning.
      - .4 When temporary protection is required while other traffic control devices are being erected or taken down.
      - .5 For emergency protection when other traffic control devices are not readily available.
      - .6 In situations where complete protection for workers, working equipment, and public traffic is not provided by other traffic control devices.
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- .7 When construction traffic is crossing a roadway.
  - .3 Maximum delays to public traffic due to Contractor's operators: ten minutes at any one time during day-time operations.
  - .4 Changes to traffic control operation are to be reviewed by DR and Park Reserves Administration.
  - .5 Safely control traffic through unique or varied construction situations.
- 1.9 Operational Requirements
- .1 Maintain existing conditions for traffic throughout period of Contract except when required for construction under Contract and when measures have been taken as specified herein and reviewed by DR to protect and control public traffic.
  - .2 At the discretion of the DR the Contractor may be required to modify the TMP to accommodate irregularities of excessive congestion of traffic flow.
  - .3 Traffic and volume of Park Reserve visitors is particularly heavy during summer month long weekends. The Contractor shall take this into account when scheduling work on Highway 4. Lane closures shall not be permitted during long weekends between the months of May and September.
  - .4 Parking vehicles along Highway 4 is not permitted except during lane closures.
  - .5 Remove signs and barriers upon completion of the work.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 References
- .1 Government of Canada:
    - .1 Canada Labour Code - Part II.
    - .2 Canada Occupational Health and Safety Regulations.
  - .2 National Building Code of Canada (NBC):
    - .1 Part 8, Safety Measures at Construction and Demolition Sites.
  - .3 Canadian Electrical Code (as amended).
  - .4 Canadian Standards Association (CSA):
    - .1 CSA S269.1, Falsework for Construction Purposes.
    - .2 CSA S269.2, Access Scaffolding for Construction Purposes.
    - .3 CSA-S350, Code of Practice for Safety in Demolition of Structures.
    - .4 CSA-Z1006 – 10 Management of Work in Confined Space.
    - .5 CSA-Z462, Workplace Electrical Safety Standard.
  - .5 National Fire Code of Canada 2010 (as amended):
    - .1 Part 5 – Hazardous Processes and Operations Division B as applicable and required.
  - .6 American National Standards Institute (ANSI):
    - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
  - .7 Province of British Columbia:
    - .1 Workers Compensation Act, Part 3, Occupational Health and Safety.
    - .2 Occupational Health and Safety Regulation.
  - .8 Respectful Workplace Policy
    - .1 <https://www.worksafebc.com/en/health-safety/hazards-exposures/bullying-harassment>
    - .2 <https://www.ccohs.ca/oshanswers/psychosocial/bullying.html>
- 1.2 Workers Compensation Board Coverage
- .1 Comply fully with the Workers' Compensation Act, regulations, and orders made pursuant thereto, and any amendments up to the completion of the work.
  - .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.
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- 1.3 Compliance with Regulations .1 PC may terminate the Contract without liability to PC where the Contractor, in the opinion of PC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent, and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- 1.4 Submittals .1 Submit to DR for review all submittals listed.
- .2 Work affected by submittals shall not proceed until review(s) by DR is/are complete.
- .3 Submit the following:
- .1 Health and Safety Plan within 7 days after date of Notice to Proceed and prior to commencement of Work.
- .2 Copies of reports or directions issued by federal and provincial Health and Safety inspectors.
- .3 Copies of incident and accident reports.
- .4 Complete set of Material Safety Data Sheets (MSDS) and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .5 On site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .4 The DR will review the Contractor's site-specific project Health and Safety Plan and emergency procedures and provide comments to the Contractor within 7 days after receipt of the plan. Revise the plan as appropriate and resubmit to DR for review upon request.
- .5 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 DR.
- .6 Submission of the Health and Safety Plan, and any revised version, to the DR is for information and reference purposes only. It shall not:
- .1 Be construed to imply approval by the DR.
- .2 Be interpreted as a warranty of being complete, accurate, and legislatively compliant.
- .3 Relieve the Contractor of his legal obligations for the provision of Health and Safety on the project.
- 1.5 Responsibility .1 Assume responsibility as the Prime Contractor for Work under this Contract.
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- .2 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.
  - .3 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.
  - .4 Contractor to complete a danger tree assessment prior to trail construction and to address danger trees as necessary to ensure safety of workers. All danger tree works subject to prior written approval by the EM.
- 1.6 Health and Safety Coordinator .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. The Health and Safety Coordinator must:
- .1 Have site-related working experience.
  - .2 Have working knowledge of occupational Health and Safety regulations.
  - .3 Be responsible for completing all Health and Safety training and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform Work.
  - .4 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
  - .5 Be on site during execution of work.
- 1.7 General Conditions .1 Provide safety barricades and lights around Work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Secure Work site before leaving each day as deemed necessary to protect site against entry from non-authorized persons / entry by animals overnight.
  - .3 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Work site.
    - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
- 1.8 Project/Site Conditions .1 Potential work hazards onsite include: overhead and buried electrical utilities, branch and tree falls particularly in high winds, working in remote locations, highway traffic, bears, and extreme weather.
- .2 The Contractor is solely responsible for all utility detection and clearances prior to starting work.
  - .3 Contract Drawings are based upon record information and shall not be relied on as the sole source of utility information.
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| 1.9 Regulatory Requirements | .1  | Comply with specified codes, acts, bylaws, standards, and regulations to ensure safe operations at site.   |
|                             | .2  | In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the DR will advise on the course of action to be followed. |
|                             |     |  |
| 1.10 Work Permits           | .1  | Obtain permit(s) related to project before start of work.  |
|                             |     |  |
| 1.11 Filing of Notice       | .1  | The Contractor is to file Notice of Project with Provincial authorities prior to beginning of Work.  |
|                             | .2  | Provide copies of all notices to the DR.   |
|                             |     |  |
| 1.12 Health and Safety Plan | .1  | Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.  |
|                             | .2  | Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:   |
|                             | .1  | Primary requirements:  |
|                             | .1  | Contractor's safety policy.  |
|                             | .2  | Identification of applicable compliance obligations.   |
|                             | .3  | Definition of responsibilities for project safety/organization chart for project.  |
|                             | .4  | General safety rules for project.  |
|                             | .5  | Job-specific safe work procedures.   |
|                             | .6  | Inspection policy and procedures.  |
|                             | .7  | Incident reporting and investigation policy and procedures.  |
|                             | .8  | Occupational Health and Safety Committee/Representative procedures.  |
|                             | .9  | Occupational Health and Safety meetings.   |
|                             | .10 | Occupational Health and Safety communications and record keeping procedures.   |
|                             | .2  | Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.  |
|                             | .3  | List hazardous materials to be brought on site as required by work.  |
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- .4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
    - .5 Identify personal protective equipment to be used by workers.
    - .6 Identify personnel and alternates responsible for site Safety and Health.
    - .7 Identify personnel training requirements and training plan, including site orientation for new workers.
    - .8 Submit plan for protection of both Workers and the general public coming onto the work sites with respect to the novel Coronavirus 19 (COVID-19). This plan should include, but not be limited to personal protection equipment, social distancing, supply and use of sanitizers and washing, training, minimizing the movement of workers into and out of the Tofino/Ucluelet area, and prevention of the transmission of the virus on construction and office materials including paperwork. This plan must be updated regularly to conform to new and changing public health information and regulations.
  - .3 Develop the plan in collaboration with all Subcontractors. Ensure that work/activities of Subcontractors are included in the hazard assessment and are reflected in the plan.
  - .4 Revise and update Health and Safety Plan as required, and re-submit to the DR.
  - .5 DR's review: the review of Health and Safety Plan by PC shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.
- 1.13 Emergency Procedures
- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
    - .1 Designated personnel from own company.
    - .2 Regulatory agencies applicable to work and as per legislated regulations.
    - .3 Local emergency resources.
    - .4 DR.
  - .2 Include the following provisions in the emergency procedures:
    - .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
    - .2 Evacuate all workers safely.
    - .3 Check and confirm the safe evacuation of all workers.
    - .4 Notify the fire department or other emergency responders.
    - .5 Notify adjacent workplaces or residences which may be affected if the
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		risk extends beyond the workplace.
	.6	Notify DR.
	.3	Provide written rescue/evacuation procedures as required for, but not limited to:
	.1	Work at high angles.
	.2	Work in confined spaces or where there is a risk of entrapment.
	.3	Work with hazardous substances.
	.4	Underground work.
	.5	Work on, over, under, and adjacent to water.
	.6	Workplaces where there are persons who require physical assistance to be moved.
	.4	Design and mark emergency exit routes to provide quick and unimpeded exit.
	.5	Revise and update emergency procedures as required, and re-submit to the DR.
1.14 Hazardous Products	.1	Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of MSDSs acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
	.2	Where use of hazardous and toxic products cannot be avoided:
	.1	Advise DR beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00 – Submittal Procedures.
1.15 Overloading	.1	Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.
1.16 Falsework	.1	Design and construct falsework in accordance with CSA-S269.1.
1.17 Scaffolding	.1	Design, construct, and maintain scaffolding in a rigid, secure, and safe manner, in accordance with CAN/CSA-S269.2 and the British Columbia Occupational Health and Safety Regulations.
1.18 Confined Spaces	.1	Carry out work in confined spaces in compliance with provincial regulations.
1.19 Blasting	.1	Blasting or other use of explosives is not permitted within the Park Reserve.

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1.20 Powder Actuated Devices	.1	Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the DR.
1.21 Fire Safety and Hot Work	.1	Obtain DR's authorization before any welding, cutting, straightening, or any other hot work operations can be carried out onsite.
	.2	Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices, grinding with equipment which produces sparks, and asphalt paving.
	.3	Store oily/paint-soaked rags, waste products, empty containers, and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
	.4	Handle, store, use, and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.
1.22 Unforeseen Hazards	.1	Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of the work, immediately stop work and advise the DR verbally and in writing.
1.23 Respectful Workplace Policy	.1	Submit a copy of the Contractor's Respectful Workplace Policy (or equivalent) including, but not limited to the following: <ul style="list-style-type: none"><li>.1 What constitutes harassing/bullying/discriminatory behavior</li><li>.2 How to report inappropriate behaviour</li><li>.3 Options available for resolution</li><li>.4 Responsibility to report</li></ul>
	.2	Additional information is available at: <ul style="list-style-type: none"><li>.1 <a href="https://www.worksafebc.com/en/health-safety/hazards-exposures/bullying-harassment">https://www.worksafebc.com/en/health-safety/hazards-exposures/bullying-harassment</a></li><li>.2 <a href="https://www.ccohs.ca/oshanswers/psychosocial/bullying.html">https://www.ccohs.ca/oshanswers/psychosocial/bullying.html</a></li></ul>
1.24 Posted Documents	.1	Post legible versions of the following documents on site: <ul style="list-style-type: none"><li>.1 Health and Safety Plan.</li><li>.2 Sequence of work.</li><li>.3 Emergency procedures.</li><li>.4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.</li><li>.5 Notice of Project.</li><li>.6 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.</li></ul>

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- .7 WHMIS documents.
- .8 MSDSs.
- .9 List of names of Joint Health and Safety Committee members, or Health and Safety Representative.
- .10 Respectful Workplace Policy (or equivalent)
- .2 Post all MSDSs onsite, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the DR.
- 1.25 Meetings
  - .1 Schedule and administer a Health and Safety meeting with DR prior to commencement of Work.
  - .2 Attend the Health and Safety pre-construction meeting and all subsequent meetings called by the DR.
  - .3 Contractor to hold regular Health and Safety meetings onsite as required by applicable legislation.
  - .4 All Health and Safety documentation / meeting minutes completed by the Contractor are to forward to the DR.
- 1.26 Correction of Non-Compliance
  - .1 Immediately address Health and Safety non-compliance issues identified by the DR.
  - .2 Provide DR with written report of action taken to correct non-compliance with issues identified.
  - .3 The DR may issue a "stop work order" if non-compliance with Health and Safety regulations is not corrected immediately or within posted time. The General Contractor/Subcontractors will be responsible for any costs arising from such a "stop work order".

**END OF SECTION**

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**PART 1 - GENERAL****1.1 Measurement for .1  
Payment****Payment for temporary environmental procedures:**

- .1 Payment for the Contractor to implement Temporary Environmental Procedures as directed by the Owner's Environmental Monitor (OEM) and the Departmental Representative (DR) will be at the unit rates tendered in the unit price table and shall include full compensation for all labour, material, and equipment necessary and incidental for the supply, installation, maintenance, and removal for each Temporary Environmental Procedure.
- .2 Measurement for payment for each Temporary Environmental Procedure shall be made by the "unit of measurement" detailed in Table 1 below, measured in place, and accepted by the DR. Overlap to be considered incidental in the payment item.

Table 1 – Temporary Environmental Procedures

<b>Environmental Procedure</b>	<b>Unit of Measurement</b>
Pre-Staked Silt Fence Barrier	Per linear metre supplied, installed and removed
Erosion Control Blanket (C32BD) (all natural & bio-degradable)	Per square metre supplied, installed and removed
Poly or Nylon Sandbags	Per sand bag supplied, installed and removed
Poly Sheeting 6 mm, 3 metres by 50 metres	Per square metre
Rock Check Dams	Per check dam supplied, installed and removed
Orange Safety Fencing, 1.4 metres height	Per linear metre supplied, installed and removed
Small Wetland Filter Bag	Per filter bag supplied, installed and removed
Large Wetland Filter Bag	Per filter bag supplied, installed and removed
50 mm Diameter Trash Pump and 61 m Discharge Hose	Per day supplied, installed and removed
75 mm Diameter Trash Pump and 61 m Discharge Hose	Per day supplied, installed and removed

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- .3 The Contractor shall note that the quantities for erosion control blanket in the Temporary Environmental Procedures is in addition to the quantities for permanent erosion control blanket in the Pricing Schedule.
  - .4 Additional payment for this item for quantities exceeding the Contract Quantities in Table 1 above shall be at the unit price provided by the Contractor in the Pricing Schedule for each Temporary Environmental Procedure, supplied, installed, maintained, and removed as measured and accepted by the DR.
  - .5 There will be no consideration for any other additional payment or extension of contract time, for events including but not limited to shut downs due to heavy rain events, breeding bird timing restrictions, amphibian timing restrictions, or other wildlife encounters, for the Contractor other than Items 1.1.1.1 and 1.1.1.3 to implement the Temporary Environmental Procedures or as specified elsewhere in the Contract.
- .2 Payment for invasive species control:
- .1 Payment for this item shall be as described in Section 31 93 02 – Invasive Species Control, Clause 1.2.
- .3 Payment for Standby Equipment and Materials:
- .1 The Contractor is required to provide, store on-site, and maintain the specified quantities for the duration of the contract, the mandatory standby equipment and materials detailed in Table 2 below. Measurement for payment for this item shall be at the Lump Sum price tendered for standby equipment and material. If the equipment and/or materials are required to be implemented, The cost of replacement equipment shall be included in the unit prices tendered for the Temporary Environmental Procedures. Quantities of standby equipment and materials are subject to verification by the DR.
  - .2 The Contractor shall immediately replace, not later than 48 hours, any standby equipment and/or material implemented to maintain the required quantities of mandatory standby equipment and materials stored on-site.

Table 2 – Mandatory Standby Equipment and Materials

<b>Standby Equipment and Materials</b>	<b>Standby Quantity</b>
50 mm Diameter Trash Pump and 61 m Discharge Hose	2
75 mm Diameter Trash Pump and 61 m Discharge Hose	2
Poly or Nylon Sandbags	500
Poly Sheeting 6 mm, 3 metres by 50 metres	450 square metres
Coconut Erosion Control Blanket (C32BD) 3 metres by 50 metres (all natural & bio-degradable)	450 square metres

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Standby Equipment and Materials	Standby Quantity
Wooden Stakes, between 0.7 metres and 1.0 metre in length	150
Pre-Staked Silt Fence Barrier	600 metres
Crushed Rock, $\phi$ 15 cm	5 cubic metres
Pea Gravel	2 cubic metres
Orange Safety Fencing, 1.4 metres height	200 metres
Floating Sorbent Booms 100mm diameter (in addition to those included in spill kits)	60 metres
Large Spill Kit capable of containing 110% of the Volume of Fuel and Fluids in the Contractor's Largest Machinery on-site	2

## 1.2 Environmental Significance

- .1 The Project is contained within the boundaries of the Pacific Rim National Park Reserve, an area of significant ecological importance. The area is a coastal temperate rainforest, and a protected area of the Clayoquot Sound UNESCO World Biosphere Reserve. The reserve is home to old growth rainforest, dozens of protected species at risk, and highly sensitive ecosystems. The work site is located entirely within sensitive old growth rainforest and spruce fringe ecosystem. Limiting impact beyond the project footprint and protecting remaining trees and tree roots during construction is required.
  - .2 Within the reserve, the precipitation is high, 400 to 500mm per month on average, with the potential for heavy rainfall events, 50 to 100mm in 24 hours. The schedule of works needs to be considered very carefully and work must be staged incrementally to avoid having large areas exposed at one time. There are several springs and a significant amount of overland flow that accumulates at the project location when it is raining. Water management during construction is expected to be a significant effort, and specialized mitigation measures will be required. The water table is perched on the underlying clay and standing water present during the winter months, particularly in the lower part of the slope. Specialized construction techniques and mitigation measures will be required. Temporary slope stability, sediment generation and equipment access will be affected by heavy rainfall events. The contractor should expect to limit work on the slope during (and potentially after) heavy rainfall events
  - .3 There are no watercourses located within the project footprint. However, the roadside ditch along Hwy 4 and the marine shoreline adjacent to the worksite are considered sensitive aquatic habitat and must be protected during construction, especially from the release of sediment and deleterious substances.
  - .4 Due to the complicated and extreme environmental conditions of the Project area, the Contractor will need to factor environmental issues and requirements into all components of the approach to work and schedule and coordinate extensively with the OEM in order to successfully complete this Project.
  - .5 The Contractor shall be in full compliance with the contract environmental procedures, all regulatory approval terms and conditions and all applicable
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environmental legislation at all times throughout the duration of the contract, including during any shutdown periods.

- .6 Where, in the sole discretion of the DR or the OEM, the Contractor is not in full compliance with the contract environmental procedures, legislation or regulatory approval terms and conditions or fails to implement any environmental procedures direction from the DR or the OEM, and the Contractor, following notification from the DR or the OEM of any event of non-compliance, verbally or in writing, fails to immediately without any delay remedy any event of non-compliance, the Owner may terminate this contract upon written notice and the Contractor shall not be entitled to any claim for compensation from any loss or damages including, but not limited to, business losses or loss of profit. This right of the Owner to terminate the contract is in addition to any other Owner rights stipulated elsewhere in the contract.

### 1.3 Definitions

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare, and/or the ecosystem health and functioning; unfavorable alterations ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally, and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy, and radioactive material as well as other pollutants.
- .3 Invasive plants: are any alien plant species that have the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems. Invasive plants have the capacity to establish quickly and easily on both disturbed and undisturbed sites, and can cause widespread negative economic, social, and environmental impacts.
- .4 Wetland: is a swamp, marsh, or other similar area that supports natural vegetation that is distinct from the adjacent upland areas. More specifically, a Wetland is an area where a water table is at, near, or above the surface or where soils are water-saturated for a sufficient length of time that excess water and resulting low oxygen levels are principal determinants of vegetation and soil development. The Contractor shall rely on the Contract Drawings which delineate Wetland zones and the additional direction of the OEM for the determination of whether any other area is defined as a Wetland.
- .5 Watercourse: a Watercourse shall be defined as a natural or man-made channel from a permanent or periodical natural source, flowing in a particular direction and in a defined channel having a bed and banks or sides and discharging into another stream or body of water. It may sometimes be dry and may also include all highway ditches. The Contractor shall rely on the additional direction of the OEM for the determination of whether any natural or man-made channel or ditch is defined as a Watercourse.
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- .6 Temporary Environmental Procedures: Temporary environmental procedures are limited to those environmental procedures specifically directed by the OEM or the DR for which the Contractor shall be paid on a time and materials basis. Temporary environmental procedures do not include any procedures for which this contract specifies as being incidental to the Work.
  - .7 Riparian Areas: A Riparian Area is the area immediately adjacent to a watercourse, ditch, stream, creek, river, lake or wetland that is connected to fish bearing habitat downstream. Riparian Areas are 30 metres on either side of the Watercourse, ditch, stream, creek, river, lake, or Wetland or 15 metres from the top of a ravine bank on larger ravines. Riparian Areas that have been cleared of vegetation, either fully or partially, under previous contracts are considered to be Riparian Areas.
  - .8 High water line: The maximum limit of a Watercourse as defined by the location of the terrestrial rooted vegetation as detailed in Figure 7 of the “Fish-stream Crossing Guidebook” revised September 2012, published by the BC Ministry of Forests, Lands, and Natural Resource Operations and Ministry of Environment.
  - .9 “Owner’s Environmental Monitor” (OEM) shall mean a representative appointed by PCA for the purpose of execution of the contract.
  - .10 “Environmental Management Plan” (EMP) shall mean the “Environmental Management Plan for ʔapsčiik ʔašii - Going in the Right Direction on the Trail Construction” Draft 1, prepared by Wood PCL and Dated June, 2019. Items contained in the EMP with cost implications are included in these Specifications. The EMP provides background information and details that will explain the Contractor the importance and rational of the environmental works.
- 1.4 Regulatory Overview
- .1 The Contractor shall comply with all applicable environmental laws, regulations and requirements of Federal authorities, and acquire and comply with such permits, approvals and authorizations as may be required.
- 1.5 General
- .1 Due to the significant environmental requirements of this project, the environmental monitoring component will be provided directly by the Owner in the form of an Owner's Environmental Monitor (OEM). The OEM will be onsite at all times during construction and will have the authority under the DR to direct the Contractor with regards to installing, maintaining and removing temporary environmental procedures and ensuring that appropriate installation and maintenance measures are followed. The OEM will also have the authority to shut down construction, especially during heavy rainfall events, or other events that preclude effective environmental mitigation.
  - .2 The Contractor will therefore NOT be required to hire a separate Environmental Monitor for this project, however, they will still be responsible for purchasing and effectively implementing all the mitigation measures described in these Environmental Procedures under the direction of the OEM.
  - .3 It is imperative that the Contractor understands that the environmental procedures are a cooperative effort between the Contractor, the DR and the OEM. Refer to
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Section 01 11 00, General Instructions, Clause 1.41.2, Submission of Tender, for additional information.

- .4 Environmental Procedures shall be a component of the initial contractor orientations for all persons working for the Contractor including sub-contractor's personnel and all daily tailgate meetings.
- .5 The EMP provides additional background information and details that will explain to the Contractor the importance and rational of the environmental works. The EMP should be used as a reference by the Contractor & OEM when additional detail beyond that provided in the Specifications is required. The EMP contains an environmental mapbook which should be used by the Contractor as a scheduling and planning tool to plan work appropriately within sensitive habitats.
- .6 After area is cleared of amphibians, breeding birds or other wildlife, Contractor must work diligently to ensure that work is completed in a timely manner and in a way that does not encourage wildlife to re-enter the work zone
- .7 The Contractor is required to adhere to the requirements of the Environmental Procedures at all times and will be required to keep a copy of the Environmental Procedures Specification on site for reference at all times during construction.
- .8 The Contractor must coordinate with the OEM as to the construction activities and up-to-date schedule so that the requirement for salvage operations and/or pre-clearing surveys can be identified well in advance and environmental specialists can be scheduled to perform the work. A minimum of 10 days notice of work area is required."; "After area is cleared of amphibians, breeding birds or other wildlife, Contractor must work diligently to ensure that work is completed in a timely manner and in a way that does not encourage wildlife to re-enter the work zone.

- 1.6 Wildlife Habitat
- .1 The Contractor will ensure that all staff and all sub-contractors are familiar with the wildlife protection and mitigation requirements and shall receive prior to the start of construction activities wildlife encounter training from a Parks representative in order to develop protocols for dealing with large carnivores (ie., cougars, wolves and bears) encountered within the work site during construction activities. If large carnivores or their habitat, such as bear dens, are noted in the vicinity of the Project, construction activities may need to stop in the area until appropriate setback buffers can be established or the carnivores vacate the area.
  - .2 The Environment Canada migratory bird nesting window for the Northern Pacific Rainforest (Pacific Rim National Park Reserve) is between March 12th and August 17<sup>th</sup> inclusive. Any tree clearing required during this period must be approved by the DR and the OEM, and preceded by a breeding bird survey by the OEM. All other construction activities (e.g., removal of slash/log piles, grubbing, etc.) during this window will also require a breeding bird activity survey. The Contractor is required to adhere to the PCA Migratory Bird Guidance to maintain compliance with the MBCA.
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- .3 The Contractor shall include in their schedule 10 days advance notice to the OEM to permit the OEM to coordinate bird activity surveys prior to starting the construction activities in each segment of the work. In the event that the OEM identifies an active nest or nesting behavior in an area, construction activities may be delayed, modified or restricted in the vicinity of the nesting area.
  - .4 The Contractor must avoid inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs (ie. incidental take) in accordance with the Migratory Bird Convention Act (MBCA).
  - .5 The Contractor shall conduct all construction activities in a manner that is sensitive to wildlife and wildlife habitat and in accordance with the Canada National Parks Act (CNPA). No feeding, disturbing or harassing of wildlife will occur. If wildlife is encountered, allow birds, mammals, reptiles, and amphibians to passively disperse and contact the OEM for further advice. Do not physically handle wildlife.
  - .6 The Contractor shall notify the OEM and DR of any observations of wildlife or specific wildlife habitats (ie., nests, denning sites, or burrows).
  - .7 Domestic pets (ie., dogs) are not permitted on site.
  - .8 Dromedary Jumping-slug, protected as a Threatened species under SARA, is often associated with old growth habitat present on the Long Beach Escarpment and considered to be suitable habitat for the species. The Contractor is required to make allowances (i.e., reduced work speed) during construction activities for the OEM to visually monitor for animals during the removal of stumps and large woody debris, as per the DJS Management Plan and SARA authorization for the project. The OEM will conduct pre-construction surveys for important habitat features and flag features requiring salvage and observation in advance of the Construction activities along the entire length of trail.
  - .9 In areas where old, rotted stumps (i.e., they were present prior to the onset of the Project), large logs and root wads, debris piles, etc. are found, salvages of this cover habitat itself will be conducted to protect and limit impacts on wildlife species using this type of habitat. Structures to retain include large (>50 cm diameter) rotten stumps, large (> 50 cm diameter, decay class 3-5) logs, and woodpiles. These should be placed away from the construction footprint of the trail but within 10 m of where they were removed. Densities of these retained structures should be at least as high as the original densities along the trail.
- 1.7 Aquatic Habitat .1 Sensitive aquatic habitat on or near the project footprint includes the ditches along Hwy 4, small isolated wetland pockets in the spruce fringe forest at the base of the escarpment, Watercourse 24 (hwy km 13+200) where the Hwy ditch will be re-routed, and the adjacent marine shoreline along Long Beach. None of the wetlands or watercourses in the project footprint are considered fish bearing, however they are to be treated as sensitive aquatic habitat as they may have amphibians or amphibian egg masses in them during the course of construction.
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- .2 Watercourses and wetlands shall not be crossed by machinery at any time unless approved by the OEM. Machinery shall not track over the beach or within 10 m of the marine shoreline at any time.
  - .3 The Contractor shall not dump excavated fill, waste material, or debris in any watercourse or water body.
  - .4 Mitigation measures are required to prevent the release of sediment laden water into watercourses, ditches, wetlands or the marine shoreline. In addition to sediment management, measures should be taken to prevent the accidental release of fuels or hazardous materials into aquatic habitat.
  - .5 Cement-based products including grouts and concrete are lethal to fish, amphibians, and many other aquatic organisms. One litre of concrete wash water or leachate in 1000L of water will kill fish. Raw product or leachate entering a water body will alter water chemistry, making it more basic or alkaline. Environmental mitigation while using concrete materials shall be in compliance with Section 03 30 00 – Cast-in-Place Concrete of the Contract.
  - .6 Water management and the control of runoff water from the escarpment is expected to be a large component of mitigation during construction. Runoff water may need to be diverted and pumped around the worksite, and discharged into a well vegetated forested area at least 30 m away from all aquatic habitat, as approved by the OEM.
  - .7 In water works are not permitted.
- 1.8 Protection of Trees and Tree Roots
- .1 Retain all large trees (>100 cm diameter at breast height, >35 m height) and veteran crown class & avoid impacts to their roots.
  - .2 Spatially limited rock walls to avoid mature trees & root systems will be implemented on a site by site basis as large tree roots are encountered during trail excavation. These site-specific procedures will be guided by the geotechnical engineer, the OEM, and Parks where required.
  - .3 For trees located next to the trail that are to be retained and whose roots are exposed during topsoil stripping, structural tree roots greater than 5 cm diameter shall be hand excavated to avoid damage to roots and fabric shall be placed over exposed roots.
  - .4 The Contractor must limit activities that result in soil compaction or disturbance around and over tree roots. Heavy equipment must not be operated within the dripline of trees.
  - .5 Additional felling of trees must be approved by the Owner and completed with the OEM on site. Care must be taken to remove only those trees flagged for removal.
  - .6 The Contractor must flag the limits of clearing in the work area prior to beginning clearing activities. Mature trees to be protected must be clearly marked as such. The plan for tree clearing and protection must be reviewed by the OEM and communicated to site staff prior to commencing any clearing activities.
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- .7 Should any potential danger trees be identified during construction on the escarpment, the OEM will assess them to confirm whether they are wildlife trees and contain species, nests and/or dens prior to cutting and removal. If trees are deemed to provide wildlife habitat value, individual tree prescriptions may be required to protect the ecological function of the tree.
- 1.9 Amphibian .1 Amphibians and their habitat are widespread within PRNPR and could be present throughout the entire area of the trail works. There are 7 amphibian species that may breed or migrating in the Project area including 3 that are Species At Risk. The timing of amphibian breeding and migrations are known in a broad sense, but the exact onset and ending of each breeding and migratory period varies from year to year and are difficult to predict as they are largely weather dependent. In the summer months, migrations are triggered by rain events following periods of dry weather. Pulses of migrating amphibians could come into direct conflict with machinery and crews during trail paving, putting a relatively large proportion of amphibians at risk.
- Habitat Protection and Salvage
- .2 The Contractor shall ensure that their schedule allows additional time required for the OEM to conduct the required amphibian survey and salvage prior to paving in each segment of the work.
- .3 The Contractor and OEM shall coordinate their efforts to avoid conflicts with the work and to ensure these requirements are met within a timely manner.
- .4 The Contractor shall provide a minimum of ten working days' notice for each 1 km section of trail and work in each environmentally sensitive area (e.g. each Watercourse, Riparian Area and Wetlands) or Amphibian Breeding Habitat and Migration area
- .5 The Contractor shall make allowances (ie. reduced work speed) during construction activities for the OEM to visually monitor for amphibians and other wildlife ahead of paving equipment.
- .6 After an area is cleared of amphibians, the Contractor shall commence work within three days and work diligently to complete the construction activities in a timely manner. Costs of salvage rework will be charged to the Contractor if work is not begun within three days following the completion of amphibian salvage and/or work does not continue at a reasonable rate to complete the work.
- .7 Events beyond the Contractors control such as weather delays that result in areas requiring additional salvage work shall not be charged to the Contractor.
- .8 Any hazardous or toxic products used during paving will be carefully contained to ensure they do not spill and contaminate sensitive habitat. Storage of these products may not occur within 100m of any surface water.
- .9 Prior to construction in a given area, the OEM / salvage crew will search for specific features, such as old stumps logs, and wood piles in order to mark their location via GPS and to flag them. The OEM / salvage crew will communicate with the construction crew when their work will be encountering these features
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and plan for their appropriate removal and salvage of amphibians and other wildlife (e.g., Dromedary Jumping slugs). These habitat features will be lifted slowly and methodically to allow for salvage crews to watch for emerging or exposed amphibians. If amphibians or other wildlife are observed in association with this work (e.g., Dromedary jumping slugs), an individual amphibian or suspected communal hibernacula are exposed), the OEM will stop construction work until all individuals have been removed. The OEM may direct the construction crew to place certain woody structures off to the side of the pathway where they will be retained as habitat.

- .10 When moving large woody debris or other construction materials on site, the Contractor shall employ a 'pick up and place' technique rather than dragging logs or other materials.
- .11 Large/decaying stumps and LWD should be salvaged and remain on site to the greatest extent possible. If this material needs to be removed for any reason, the OEM may direct the Contractor to set aside excavated materials from any excavations in areas for up to 3 hours prior to moving material to the final disposal location to allow for amphibian (and other animal) salvage.
- .12 The Contractor shall make allowances (i.e., reduced work speed) during construction activities for the OEM to visually monitor for animals (e.g., amphibians and slugs) during the removal of stumps and large woody debris (LWD).

#### 1.10 Invasive Plant Management

- .1 Invasive plants are known to occur in the area where the construction works will occur, and preventative measures are needed to limit their spread.
  - .2 All construction vehicles, equipment, machinery, and hand tools shall be inspected and cleaned prior to every entry into the Park Reserve, prior to every exit from the Park Reserve, and prior to every travel to another section (ie., between each access point) of the Project area while in the Park Reserve.
  - .3 All construction staff clothing shall be free of soil and vegetation debris prior to entering the Park Reserve each work day, prior to exiting the Park Reserve each day, and prior to every travel to another section of the Project area while in the Park Reserve. Boots shall be washed of all soil materials.
  - .4 All construction materials brought into the Park Reserve must be free of invasive species. Sources of all materials shall be inspected by the Contractor and OEM and/or DR prior to supply of material to determine if invasive species are present and to formulate a protocol to avoid introducing these into the Park Reserve. This may include washing material prior to use, avoiding contaminated areas, constructing clean haul routes, and finding new, clean sources of materials.
  - .5 Invasive plant removal shall be conducted in every area where construction operations have taken place for 2 years following construction on a monthly basis, both during and after construction should invasive plants be identified by the DR, OEM, or PCA staff. See Section 31 93 02 - Invasive Species Control for details.
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- 1.11 Precipitation .1 The Contractor is notified that, within the geographical area of the work, the precipitation is high, 400 to 500mm per month on average between October and April, with the potential for heavy rainfall events, 50 to 100mm in 24 hours, which can occur at any time of the year.
- .2 For rainfall events, the OEM and the DR may shut down all work activities. No consideration for additional payment will be considered for rainfall event shut-downs. The Contractor shall maintain and repair, if necessary, all environmental protection measures including Temporary Environmental Procedures and those incidental to construction, in addition to any new Temporary Environmental Procedures as directed by the OEM during shutdowns. All environmental protection measures will be inspected by the Contractor and the OEM after each rainfall event of more than 15 mm of rain and in areas prone to flooding or excessive run-off as directed by the OEM. The OEM may direct that additional inspections be conducted where rainfall exceeds 25 mm in any 24-hour period.
- .3 The Contractor shall ensure that the required number and size of mandatory standby equipment and materials specified in Table 2 are readily accessible on-site to deal with construction activities during high precipitation events.
- .4 The Contractor must schedule paving to occur during dry weather periods as this allows for easier control of contaminated runoff and sediment. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants. Extreme rain events may require a work shut-down at the discretion of the OEM.
- 1.12 Soil and Sediment Erosion Control .1 Temporary Environmental Procedures must be in compliance with Federal legislation and regulations and direction from the OEM where required. Notwithstanding, Contractors shall reference the provincial MOE “Standards and Best Practices for Instream Works (2004)” for best practices for instream sediment and the provincial Ministry of Forests “Best Management Practices Handbook: Hillslope Restoration in BC (Nov 2001)”. These erosion and sediment control procedures are considered incidental to the Work.
- .2 The Contractor shall create a sediment and erosion control plan outlining procedures for typical trail construction and typical events (eg., heavy rainfall event). This plan shall be submitted a minimum of ten days prior to work occurring for review by the DR and the OEM. The DR and OEM may request changes to any plan to ensure that proposed methods for sediment and erosion control are satisfactory for each Project site. No additional payment shall be made for environmental protection measures that are incidental to the work.
- .3 The Contractor shall install, maintain and remove all Temporary Environmental Procedures as directed by the OEM and the DR.
- .4 Temporary Environmental Procedures, where required by the contract or as directed by the DR and OEM, are to be installed prior to starting any
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construction activities to prevent sediment from entering any waterways.

- .5 Sediment and erosion control measures shall be: a) inspected by Contractor and OEM regularly at a frequency commensurate with the risk, nature, location, and seasonality of the work and adapted or revised, as appropriate; and b) repaired by Contractor as necessary in a timely manner, commensurate with the risk, nature, location, and seasonality of the work, maintained by Contractor until construction is completed, and the affected areas are sufficiently stabilized and revegetated, so there is minimal risk of erosion or sedimentation at the site as a result of construction activities.
- .6 At OEM's direction, Contractor may be responsible for installing and maintaining filter fabric dams, rock check dams, settling ponds, French drains, interception ditches, and silt fencing as needed on a site specific basis to control erosion.
- .7 Excavations and grubbing activities will be stopped during intense rainfall events or whenever surface erosion has the potential to affect a watercourse. Stoppages will be at the discretion of the OEM. Work will not resume until corrective actions have been implemented to the satisfaction of the OEM.

#### 1.13 Drainage and Wastewater Discharge

- .1 The Contractor shall provide temporary drainage as necessary to keep excavations and site free from water. The Contractor shall submit a dewatering plan for each project site where dewatering is incidental to the work a minimum of ten days prior to work occurring for review by the DR and the OEM. The DR and OEM may request changes to any plan to ensure that proposed methods for dewatering are satisfactory for each Project site. No additional payment shall be made for dewatering that is incidental to the work.
- .2 The Contractor shall not discharge water containing suspended materials into Watercourses, Riparian Areas, Wetlands, amphibian habitat, sanitary sewer or drainage systems.
- .3 Any water discharged or rainfall runoff from the site that flows into the environment (e.g., waterbody, watercourse, drain, ditch, or ground) must comply with BC Working Water Quality Guidelines and the BC Approved Water Quality Guidelines. The OEM is responsible for conducting all water quality sampling and analysis to determine its chemical composition. Contractor will be responsible for any corrective action deemed necessary by OEM.
- .4 Excavations and grubbing activities will be stopped during intense rainfall events or whenever surface erosion has the potential to affect a watercourse. Stoppages will be at the discretion of the OEM. Work will not resume until corrective actions have been implemented to the satisfaction of the OEM

#### 1.14 Pollution Control

- .1 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, Wetlands, water bodies or Watercourses that would result in damage to aquatic and Riparian Areas. Hazardous or toxic products, including concrete wash water, shall be stored no closer than 100 metres to any surface water.
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- .2 The Contractor shall prevent blowing dust and debris by providing dust suppression for on-site work. Water is the only allowable dust suppression measure.
  - .3 The Contractor shall provide industry standard spill kits, to the satisfaction of the DR and OEM, at all work sites refueling, lubrication and repair locations that are capable of containing 110% of the largest potential spill and shall be maintained in good working order on the construction site. All mobile equipment shall carry a smaller spill kit at all times. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
  - .4 The Contractor shall take timely and effective actions to stop, contain and clean-up all spills until the spill site is deemed to be remediated and safe to re-enter by the DR. The Owner, OEM and DR shall be notified immediately of any spill.
  - .5 In the event of a spill, the Contractor shall prioritize the clean-up and all other work shall be stopped, where appropriate, and Contractor personnel shall be devoted to spill containment and clean up.
  - .6 The costs involved in a spill incident (control, wildlife salvage, clean up, disposal of contaminants, and site remediation to pre-spill conditions), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the pre-spill condition to the satisfaction of the DR.
  - .7 Ensure hazardous or toxic products, equipment, and fuel are stored no closer than 100 m from streams, wetlands, waterbodies, or wetted areas. Spoil and stockpiles should be no less than 50 m from these features.
- 1.15 Equipment, Maintenance, and Fueling
- .1 The Contractor shall ensure that equipment and machinery are in good operating condition, clean (power washed), free of leaks, excess oil, and grease. Ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working condition.
  - .2 Hydraulic machinery shall use environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
  - .3 Equipment fueling sites will be identified by the Contractor to the satisfaction of the DR. On site storage of fuel shall not be allowed in any area other than those areas approved by the DR.
  - .4 Mobile fuel containers (ie., slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Where fuel or other fluid containers are out of the service vehicle for use, all containers must be situated on drip trays and returned to the service vehicle immediately following use.
  - .5 The Contractor shall not refuel or service equipment within 50m of any watercourse, riparian area, wetland, or surface water drainage.
  - .6 Equipment used on the Project shall be fueled with E10, and low Sulphur diesel fuels where available and shall conform to local emission requirements. The Contractor is to ensure that unnecessary idling of the vehicles is avoided.
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- .7 Oil changes, lubricant changes, greasing and machinery repairs shall be performed at only those locations satisfactory to the DR. Waste lubrication product (e.g. oil filters, used containers, used oil, etc.) shall be secured in spill-proof containers and properly recycled or disposed of at an approved facility. No waste petroleum, lubricant products or related materials are to be discarded, buried or disposed of in borrow pits, turnouts, picnic areas, viewpoints, etc. or anywhere within the work area.
  - .8 Fuel containers and lubricant products shall be stored only in secure locations to the satisfaction of the DR. Fuel tanks or other potential deleterious substance containers shall be secured to ensure they are tamperproof and cannot be drained by vandals when left overnight. Alternatively, the Contractor may hire a security person employed to prevent vandalism.
  - .9 Place drip trays, plastic sheets or absorbent pads underneath vehicles and equipment that are not in use and left on site overnight to capture any drips or leaks that may occur. Secondary equipment is to be covered with a tarp, equipped with a roof, or with a "rain-drain" or equivalent hydrocarbon filter
  - .10 Ensure that fuel/oil storage containers are not placed within 50 m of any watercourse.
  - .11 Do not store machinery within the drip line of trees.
  - .12 Limit activities that result in compaction around and over tree roots. Heavy equipment shall not be operated within the dripline of trees.
- 1.16 Operation of Equipment
- .1 Equipment movements shall be restricted to the "footprint" of the construction area cleared.
  - .2 When, in the opinion of the DR, negligence on the part of the Contractor results in damage or destruction of vegetation, natural hydrology (e.g., altering direction or rate of flow, ponding, etc.) or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible for all costs to complete restoration work including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the DR.
  - .3 The Contractor shall restrict vehicle movements to the work limits.
  - .4 Notify the OEM of any observations of denning sites or burrows at the Project site.
  - .5 Minimize the use and ensure proper storage of potential wildlife attractants such as food, garbage,
  - .6 Limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat. Artificial lighting must never be used within or near amphibian habitat. If construction timing restrictions are not possible and artificial lighting must be used outside of sensitive habitats:
    - Use down shielding or directional lighting to avoid light trespass into bird habitat.
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- To the extent practicable, use low intensity energy saving lighting and consider the use of motion or heat sensors to minimize illumination.
    - Avoid the use of bright white light, such as metal halide, halogen, fluorescent, mercury vapour and incandescent lamps."
  - .7 Equipment shall only be operated or stored within existing disturbed footprint. Contractor shall only access project areas using existing access points. Operation of equipment is strictly prohibited in Wetlands and Watercourses.
  - .8 Minimize engine idling.
  - .9 Ensure that all equipment is maintained in good working order and has properly functioning emission controls.
  - .10 Ensure that all equipment has properly functioning noise control equipment (e.g., mufflers) designed for the equipment being operated.
- 1.17 Fire Prevention and Control
- .1 A fire extinguisher shall be carried and available for use on every piece of construction equipment and in every Contractor vehicle.
  - .2 Construction equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.
  - .3 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The DR shall be notified of any fire immediately as well as the applicable Provincial and Federal Authorities and the local municipal Fire Department. Basic instruction and phone numbers will be provided on-site by the Contractor and will be discussed in the Project start-up meeting.
  - .4 Fires or burning of waste materials is not permitted.
  - .5 Smoking within the construction area is not permitted.
  - .6 The Contractor shall obey all Parks Canada Fire Restrictions in effect throughout the duration of the contract.
- 1.18 Waste Materials Storage and Removal
- .1 The Contractor and workers shall dispose of hazardous wastes in conformance with the applicable federal and provincial regulations.
  - .2 All wastes originating from construction, trade, hazardous and domestic sources, shall not be mixed, but will be kept separate.
  - .3 Do not pile waste that is to be removed in those areas listed in Clause 1.9.1 – Table 4 as they will rapidly become inhabited by amphibians and other wildlife.
  - .4 All food wastes shall be deposited in bear-proof containers and removed daily.
  - .5 Construction, trade, hazardous waste and domestic waste materials shall be contained and removed and disposed of at an appropriate off-site waste landfill.
  - .6 A concerted effort shall be made by the Contractor and workers to reduce, reuse and recycle materials where possible.
  - .7 Sanitary facilities, such as portable container toilets, shall be provided by the Contractor and maintained in a clean condition.
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- 1.19 Wastewater Discharge Criteria
- .1 The Contractor must ensure that the work area is isolated from any flowing water and divert the clean water around the worksite so that no silt-laden or wash water is generated.
  - .2 Wash water and sediment-laden discharge water will be released onto the ground at a location that is outside of, and at least 50m away from, Wetlands, Watercourses and Riparian Areas and only with the approval of the OEM."
  - .3 Any water discharged, water used for dust control, or rainfall runoff from the Project area that flows into the environment (e.g., waterbody, Watercourse, Wetland, drain, ditch, or ground) must comply with BC Working Water Quality Guidelines and the BC Approved Water Quality Guidelines. The OEM is responsible for conducting all water quality sampling and analysis to determine its chemical composition. Contractor will be responsible for any corrective action deemed necessary by OEM.
  - .4 Water contaminated in the placing of cement and curing of concrete (see Section 03 30 00 – Cast-in-place concrete, of this specification) shall be contained and removed from the site to an approved disposal facility. The storage of any waste water from these activities must occur at least 50m from wetlands, watercourses, and other sensitive habitats
- 1.20 Environment Protection Supplies
- .1 The Contractor shall supply, transport, install and maintain all equipment and supplies relating to erosion, sediment and drainage controls necessary to complete the Work as directed by the OEM, the DR.
  - .2 The Contractor shall provide an inventory of environmental protection supplies, listed in Tables 1 and 2, prior to mobilization and in each weekly report to be submitted to the DR.
- 1.21 Access Points
1. Contractor shall only access project areas using existing access points. No new access points will be constructed as part of the paving scope of work.

## PART 2 – PRODUCTS

- 2.1 Material
- .1 Erosion Control Blanket (ECB):  
Refer to Section 31 32 19 – Geotextiles, Clause 2.1.8 – Erosion Control Blanket.
  - .2 Pre-Staked Silt Fence Barrier:
    - .1 Refer to Section 31 32 19 – Geotextiles, Clause 2.1.9 Pre-Staked Silt Fence Barrier.
  - .3 Sandbags:  
Sandbags shall be approximately 350mm X 650mm when flat and when filled with material be approximately 150mm thick. Bags up to 10% smaller or any percentage larger are acceptable.

## PART 3 – EXECUTION

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| 3.1 Installation of Erosion Control Blankets      | .1 | Refer to Section 31 32 19 – Geotextiles, Clause 3.3 – Installation of Erosion Control Blanket.   |
| 3.2 Installation of Pre-Staked Silt Fence Barrier | .1 | Refer to Section 31 32 19 – Geotextiles, Clause 3.3 – Installation of Pre-Staked Silt Fence Barrier.   |
| 3.3 Maintenance                                   | .1 | Items installed as a part of the Temporary Environmental Procedures shall be inspected by the Contractor on a weekly basis, during each significant rainfall event, or as directed by the OEM or DR and make repairs to the installations to bring them to a 'like new' condition.   |
|   | .2 | Those items installed as a part of the Temporary Environmental Procedures that require regular cleaning shall be cleaned at intervals as directed by the OEM or DR.  |
|   | .3 | Items installed as Temporary Environmental Procedures shall be removed upon completion of the project or as directed by the OEM or DR. Obtain approval of OEM prior to removal.  |
| 3.4 Site Restoration                              | .1 | During clearing, grubbing, and stripping works, the contractor must set aside and store all of the native organics that are stripped from the site, and many of the large stumps and logs to be re-used during site remediation. These items can be stored on site, space permitting, or can be temporarily stored at the High Point storage area within the park (within 5 km of the project site).     |
|   | .2 | Note that planting benches are to be created on final slopes as shown on Environmental drawings as approved by the OEM and DR.   |
|   | .3 | All cut and fill slopes, as well as all trail shoulders are to be covered in minimum 15 cm of native organics, with C32BD Erosion Control Blankets (ECB) installed over top. ECB shall be secured with hooked rebar "pins". The areas where ECB are required are shown on the environmental drawings and as directed by the Geotechnical Engineer and OEM.   |
|   | .4 | Large woody debris (stumps, logs, etc.) salvaged from the site during grubbing/stripping are to be placed on top of the ECB, as directed by the Geotechnical Engineer and OEM.   |
|   | .5 | Depending on the reach of machinery, this slope remediation may need to be done incrementally. The contractor must plan the work stages accordingly to ensure this final step of slope remediation can be completed as intended.   |
|   | .6 | All areas of soil disruption and pathway rutting, or compaction must be promptly repaired and reclaimed as directed by the OEM. Compacted soils must be rehabilitated similar to the productive capacity of the area. Any sub-grade repairs or restoration being performed in the support zone of the trail, retaining walls and finished slopes shall be approved by the Owner's Geotechnical Engineer. |

**END OF SECTION**

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**PART 1 - GENERAL****1.1 Measurement for  
Payment**

- .1 Payment for additional costs resulting from the cultural resource protection procedures shall be included in the relevant items in the table of unit prices for this Contract. Items of additional work for cultural resource protection not specifically included in the unit rate items shall be considered incidental to the work.
  - .2 Payment for “Organic Soils Excavation and Spreading in a Cultural Resource Sites” shall be full compensation for all work necessary and incidental for excavation using a smooth-edge bucket in accordance with clause 3.0 *Controlled Excavation Methodology* at a rate to permit monitoring of the material by the OAM (or their representative), and the re-spreading of the material up to six metres into the adjacent forest area by sprinkling and hand work in accordance with clause 1.8 *Cultural Resource Sites*. Material used to dress the sides of the trail shall be paid as a separate item. Also included in the unit rates tendered is standby time as described in clause 1.6.5 of this section.
  - .3 Payment for “Organic Soils Excavation from Cultural Resource Sites – Storage and Recording - Grice Bay” in Cultural Resource Sites shall be full compensation for all work necessary and incidental for excavation using a smooth-edge bucket in accordance with clause 3.0 *Controlled Excavation Methodology* at a rate to permit monitoring of the material by the OAM (or their representative), loading, hauling the material to the Grice Bay Parking Lot, stockpiling and recording source and deposit locations of the material. Also included in the unit rates tendered is standby time as described in clause 1.6.5 of this section.
  - .4 Payment for “Mineral Soil Excavation and Fill in Cultural Resource Sites” shall be full compensation for all work necessary and incidental for excavation using a smooth-edge bucket in accordance with clause 3.0 *Controlled Excavation Methodology* at a rate to permit monitoring of the material by the OAM (or their representative), hauling the material to a fill area within the archaeology site, and spreading and compacting the material. Not included in this unit rate is standby time.
  - .5 Payment for “Mineral Soil Excavation from Cultural Resource Sites – Storage and Recording - Grice Bay” shall be full compensation for all work necessary and incidental for excavation using a smooth-edge bucket in accordance with clause 3.0 *Controlled Excavation Methodology* at a rate to permit monitoring of the material by the OAM (or their representative), hauling the material to a fill area within the archaeology site, and spreading and compacting the material. Not included in this unit rate is standby time.
  - .6 Payment for “Mineral Soil Excavation, identified to be void of archaeological materials by the OAM, from Cultural Resource Sites – Disposal at J. Robbins Construction Ltd.” shall be full compensation for all work necessary and incidental for excavation using a smooth-edge bucket in accordance with clause 3.0 *Controlled Excavation Methodology* at a rate to
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permit monitoring of the material by the OAM (or their representative), loading, hauling the material to the J. Robbins site, re-spreading and compacting the material. Not included in this unit rate is standby time.

.7 Measurement for payment for excavation of these excavated materials shall be by the cubic metre of excavated void (length X width X depth) or surveyed cross sections as accepted by the DR.

.8 For work within the Cultural Resource Sites (CRS) The Contractor should allow for bidding purposes that their equipment and personnel excavating the trail through the site will be shut down for 2 hours per day. At the end of each pay period the total number of hours working in CRS sites will be compared to the number of hours shut down at these sites. If the hours shut down exceeds 25% (2 hours out of 8) an additional payment will be made for lost time. The "10 minutes per object" is provided as information only to the Contractor to help in planning this work. For example, enough time for a quick rest break, not enough time for machine maintenance or relocate equipment to work elsewhere.

#### 1.2 References

- .1 The Parks Canada Guidelines for the Management of Archaeological Resources (Parks Canada, 2005).
- .2 Canada National Parks Act (S.C. 2000, c. 32).
- .3 Cultural Resource Management Policy (2013).

#### 1.3 Cultural Significance

- .1 Parks Canada ensures that cultural resources are protected and managed appropriately in accordance with its mandate, Cultural Resource Management Policy, Guidelines for the Management of Archaeological Resources and management directives. Ensuring adequate management of cultural resources consists of preventing, reducing or mitigating impacts to cultural resource sites, artifacts and collections.
- .2 Due to the sensitivity of the cultural resources, information regarding cultural resource sites, materials, artifacts, and locations is confidential. The extent of cultural resource sites that reside within the trail work zone is identified in the Contract by linear metre, however, the Contractor will be notified of their exact locations once the Contract has been awarded. No photographs or information about cultural sites and/or resources will be made public by the contractor or sub-contractors. All materials on cultural resources provided to the Contractor must be returned to the Owner at the completion of the project.

#### 1.4 Definitions

- .1 Archaeological Site (AS): a location that contains physical remains of past human activity. Controlled excavation methodology must be followed within an AS. The OAM will be on site observing excavation in these designated areas.
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- .2 Cultural Deposits (CD): sediments and materials laid down by, or heavily modified by, human activity.
  - .3 Cultural Resource Management Zone (CRMZ): a location where there is an increased potential of cultural deposits that were not identified during the cultural resource site impact assessments and inventories. The OAM will be on site observing excavation in these designated areas. The controlled excavation methodology will be followed in these areas under the direction of the OAM.
  - .4 Chance Find Discovery: An unanticipated discovery of cultural resource site or material (artifacts/features) during construction in areas with no previously identified cultural resources.
  - .5 Culturally Modified Tree (CMT): a term which describes the modification of a tree by indigenous people as part of their traditional use.
  - .6 Cultural Resource (CR): a human work, an object or a place that is determined, on a basis of its heritage value, to be directly associated with an important aspect or aspects of human history or culture.
  - .7 Cultural Resource Site (CRS): a location that contains a human work, object, or a place that is defined to be of heritage value. This includes archaeological, historical and traditional use sites, and culturally modified trees (CMTs). The OAM must be on-site during construction in these designated areas. The OAM has the authority to stop work in regards to cultural resource requirements.
  - .8 Historical site (HS): Within the Parks Canada framework, historic is used in its broadest meaning to define the value of a cultural resource based on having heritage value. Within this framework, cultural materials 40 years or older may be considered as a historical site or historical object.
  - .9 Mineral Subsoil: Boulders, cobbles, gravel, sand, clay, and silts.
  - .10 Organic Soils: Litter-fibric-humic (LFH) layer and upper mineral A horizon, topsoil.
  - .11 Owners Archaeological Monitor (OAM): an individual retained by Parks Canada to assess and monitor for the presence/absence of cultural resource sites and recommend and implement mitigations if Chance Finds are encountered.
  - .12 Owners Environmental Monitor (OEM): an individual retained by Parks Canada to be onsite at all times during construction and will have the authority under the DR to direct the Contractor with regards to installing, maintaining and removing temporary environmental procedures and ensuring that appropriate installation and maintenance measures are followed. The OEM will also have the authority to shut down construction, especially during heavy rainfall events, or other events that preclude effective environmental mitigation. The Contractor will therefore NOT be required to hire a separate Environmental Monitor.
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- .13 Owners First Nations Monitor (OFNM): an individual retained by Parks Canada to monitor during construction. The OFNM may work directly with the OEM and OAM, and /or independently.
  - .14 Surveillance Areas (SA): locations identified during the archaeological impact assessments and inventories where cultural deposits are considered to have a moderate to high probability of occurring but are not likely to be identified during an inventory study (e.g., wet sites, deeply buried sites, isolated finds). The SAs will require surveillance in the form of field check-ins, the frequency and duration of which will be determined by the OAM in consultation with First Nations, Parks Canada, and Pacific Rim National Park Reserve. The controlled excavation methodology will only be followed in SAs if the OAM determines it is necessary to sample a selection of the organic soils or mineral subsoils for cultural materials and/or if cultural deposits are encountered.
  - .15 Traditional Use site (TUS): Landforms, natural features, cultural features or other locations of spiritual, cultural or other significance to an Indigenous community.
  - .16 Grice Bay site – Is accessible from the existing parking lot on Grice Bay approximately 4 km north of Highway 4 and west of the Tofino Airport.
- 1.5 Regulatory Overview .1 Comply with all applicable laws, regulations, and requirements of Federal, Provincial, and other regional authorities, and acquire and comply with such permits, approvals and authorizations as may be required.
- 1.6 General .1 The Owners Archaeological Monitor(s) (OAM) and Owners First Nation Monitors (OFNM) will be retained directly by the Owner. The OAM will have the authority to stop work in regards to cultural resource requirements.
- .2 Contractor will provide a minimum of 10 working days' notice for scheduling information to the OAM to enable on site monitoring coordination when needed or reasonably expected to be needed.
- .3 For all persons working for the contractor and subcontractors, cultural resource awareness training shall be a component of the initial contractor orientations and of the daily tailgate meetings. This will include training on the Chance Find Procedures.
- .4 Contractor shall coordinate and permit the OAM time to monitor the excavated material. Contractor will not be compensated for any loss of production time where the site can be bypassed and the work continued. A delay claim shall only be considered if the Contractor is not able to continue work at a productive rate and for delays in excess of those defined in clause 1.6.5 below.
- .5 In known Cultural Resource Site areas, the contractor should anticipate delays and include the cost of these delays in the unit prices tendered for excavation of materials in the CRS areas. The following duration of delay at
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each site shall be included in the rates: 2 hours per 8 hour working day shall be accumulated for each site. Upon completing work at each CRS, if the accrued delay time averages over 2 hours per 8-hour work day averaged per working week, an additional payment shall be made at a time and materials rate for the time in excess of the average of 2 hours. The contractor must record the duration and location of each delay and agree to delays with the DR on a daily basis.

- .6 Due to the significance of cultural resources within Pacific Rim National Park Reserve, Chance Find Procedures will apply for the whole length of the Trail.
- .7 All cultural resources regardless of age and condition are protected under the Canada National Parks Act. The Contractor and workers shall stop work and protect any artifacts and/or features found and request direction from the DR and OAM before proceeding with their work. No archaeological or historical artifacts shall be intentionally moved. It is illegal to remove archaeological or historical artifacts from the Pacific Rim National Park Reserve.
- .8 Within CRS, CRMZ, and SA sites, the contractor shall avoid repeated traversing of heavy equipment over the unexcavated site to avoid damage to cultural deposits. The contractor shall grub and excavate organic soils and mineral subsoils sequentially along the trail and remove from site without traversing over the organic soils and mineral subsoils, except where approved by the DR using low impact methods.

#### 1.7 Archaeological Monitor

- .1 The OAM must be present during the entire period of clearing and grubbing and any construction within known cultural resource sites (approximately 150 m of trail length), CRMZ (approximately 50 m) and SA (approximately 50 m) identified prior to contract award and any other cultural resource sites identified during construction to record and collect any observed cultural resource. The OFNM, as available, may be present during any construction within cultural resource sites identified prior to contract award and any other cultural resource sites identified during construction to record and collect observed cultural resource deposits, as appropriate.
  - .2 The DR and OAM will conduct a walk-through of each site ahead of any ground disturbance with the successful contractor to discuss the best approach for construction. Cultural resource concerns at each site will be identified. Where more sensitive features/ materials are present and to be avoided, the OAM will advise the most appropriate approach and flag any additional limitations/ constraints for the site. Any special considerations, such as lack of space for spreading of cultural sediments from within the site, or any contractor concerns will be highlighted for review by the DR and the Owner.
  - .3 The Contractor shall provide a minimum of ten working days' notice for the 150 m section of trail and work in each culturally sensitive site area (e.g.
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Cultural Resource Site, Culturally Modified Tree Sites).

- .4 Any unnecessary callouts/misuse of the allotted OAM time may/will be paid for by the contractor.

#### 1.8 Cultural Resource Sites .1

Method of excavation shall be coordinated with the DR and OAM and is outlined in Clause 3.0 *Controlled Excavation Methodology* below.

- .2 All excavated organic soils shall stay within the defined cultural resource site unless otherwise approved by the OAM and DR. Organic soils shall be spread within the site under the direction of and to the satisfaction of the DR, OAM and OEM. If it is not feasible to retain the organic soils and mineral subsoils from cultural resource sites within the area/CRS, it will be transported to a designated location at Grice Bay site in separate loads (e.g., not mixed with organic soils or mineral subsoils from other areas or non-cultural deposits) under the direction of the OAM. The piles of mineral subsoils from the CRSs will be stockpiled at the Grice Bay site location and will be kept in discrete piles, with a record and on-site marker kept of the location of each stockpile and which CRS it was removed from. This will facilitate the cultural resources assessment and management of these materials by the OAM. In cases where no cultural deposits are found within the excavated mineral subsoils, they shall be removed from the site and may be disposed at the J. Robbins site, with the approval of the OAM. The contractor shall receive payment for this excavation, hauling, placing, and disposal per clause 1.1.3 above.
  - .3 The upper organic soils being stripped for trail construction from known cultural resource sites shall remain on site, as per clause 1.8.2 above, and shall be distributed evenly back into the forest up to six (metres on either side of the trail clearing where appropriate, with a maximum depth of 150mm, and under the direction of the OAM, DR, and OEM. Spreading of organic soils can be aided by excavation equipment 'sprinkling' the organic soils while depositing it and re-spreading it after deposit. The equipment tracks must remain within the cleared trail limits. Where the equipment arm can reach into the forest without scarring or damaging trees, machine spreading is permitted. Manual spreading by trail contractor shall be used if necessary, to obtain a uniform thickness as directed by the OEM, OAM, and DR.
  - .4 Excess material from the organic soils being stripped for trail construction may be removed from a CRS at the discretion of the OAM and OEM and disposed at the designated Grice Bay location in separately identified piles, as per clause 1.8.2. It is anticipated that up to 1.8 cubic metres of organic material per linear metre of trail in CRS zones will be cast into the forest and the remainder will be disposed of at the designated Grice Bay site, as directed by the OAM.
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- 1.9 Culturally Modified Tree Sites
- .1 Due to the sensitivity of the culturally modified tree (CMT) sites, the Contractor will be notified of their locations once the Contract has been awarded.
  - .2 Several areas along the trail work zone contain CMT's. These sites have been avoided by trail routing but the Contractor and all sub-contractors are required to be aware of the site locations and to avoid them.
  - .3 It is not anticipated that the Contractor shall be required to remove CMT's. However, should CMT's be identified by the contractor within the areas to be cleared, the DR shall be notified immediately.
  - .4 Hand falling and hand sectioning of selected CMT's will be determined by the OAM and DR and completed under the guidance of the OAM. costs associated with this work will be considered incidental to clearing and grubbing.

- 1.10 Related Sections
- .1 Section 01 35 43 – Environmental Procedures.
  - .2 Section 31 11 00 – Clearing and Grubbing.
  - .3 Section 31 14 13 – Trail Work, Soil Stripping, Stockpiling and Re-spreading.
  - .4 Section 31 23 33 – Excavation, Trenching, and Backfilling.
  - .5 Section 31 93 02 – Invasive Species Control.

**PART 2 - PRODUCTS**

Not used

**PART 3 - EXECUTION**

- 3.0 Controlled Excavation Methodology
- .1 In CRS, CRMZ and SA sites, machine excavation will proceed in incremental depths between 10 - 30cm maximum. At the discretion of the OAM, the Contractor shall allow time for a sample of machine excavated materials to be raked and/or screened through 1/4" mesh to find artifacts, faunal material, and other potential diagnostic items, which will be collected for analysis. Contractor will be compensated for any loss of production time only as defined in Clause 1.6.5 above.
  - .2 All machine excavation in CRS and CRMZ will be conducted with a smooth edged/finishing bucket under the direction of the OAM. The OAM may require a sampling of areas in the SAs to be excavated with a similar technology to assess sediments for cultural materials. This methodology may also be applied in the event of Chance Finds (Clause 3.1 below) at the discretion of the OAM.
  - .3 In cases where no cultural deposits are found within the excavated organic soils, some of the organic soils may be removed from a CRS at the discretion of the OAM and OEM and disposed at the designated Grice Bay site only, with the approval of the OAM, as per Clause 1.8.3 above.
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- .4 In cases where no cultural materials are found within the excavated minerals subsoils, sediments shall be removed from the site and disposed at the designated disposal site at J. Robbins site with the approval of the OAM.

### 3.1 Chance Finds Procedure

- .1 The Chance Finds Procedure will be implemented to minimise the risk of inadvertent impact to cultural resource sites, particularly in the case where potential cultural deposits or features are identified in the absence of the OAM. It is crucial in implementing this Procedure that construction personnel understand that they are not expected to interpret the origin, integrity or significance of potential cultural deposits.
- .2 'Cultural Resource Awareness' training shall be a component of the initial contractor orientations for all persons working for the contractor and all daily tailgate meetings. The training program includes a review of this Procedure.
- .3 The most common chance finds site types which may be encountered are:
  - .1 Pre-Contact Archeological Sites – These sites can include artifact scatters, shell middens, shell-less middens, rock art, culturally modified trees (CMTs), waterlogged organic materials, and trails.
  - .2 Found or suspected Human Remains.
  - .3 Historical Sites – These sites can include historical artifacts and structures, and historical refuse such as crockery, metal and glassware indicating presence of historical camp sites, shipwrecks, cabins, temporary shelters, or sites associated with early logging and mining.
- .4 If potential cultural deposits, artifacts, human remains or suspected human remains, or features are identified, the following procedures WILL be immediately implemented:
  - .1 STOP ground disturbance work immediately that could cause additional damage to cultural deposits and retain potentially cultural deposits on-site so it may be inspected by the OAM (i.e., do not release dump truck if loaded with fill from the suspected location).
  - .2 Immediately inform DR and OAM.
  - .3 Record location of the find:
    - .1 Date (when the find was encountered).
    - .2 Observer (name of the person recording information about the find).
    - .3 Location of Find (Labelled flagging so that it may be relocated, GPS coordinates if possible).
    - .4 Type of find (e.g., archaeological, historical, suspected human remains).
    - .5 Description of the obvious disturbance to the find (by

**PART 1 - GENERAL**

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| 1.1 Quality Control Plan            | .1 | Prepare and submit to DR for review and approval a Quality Control Plan in accordance with Section 01 33 00 – Submittal Procedures, prior to project startup.   |
| 1.2 Measurement for Payment         | .1 | Payment for quality control testing shall be made at the lump sum price tendered. Payment shall be distributed as follows: 25% in the first Progress Payment, 50% equal distribution in intermediate Progress Payments, and 25% when Substantial Performance is achieved.   |
|                                     | .2 | For the Contractor's first Progress Payment, it is a condition precedent to the Owner's obligation (paragraph 3 of GC5.4) that the Contractor has provided all necessary documentation required by the Contract for the first Progress Payment.   |
| 1.3 Inspection                      | .1 | Allow DR 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 DR 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 | DR may order any 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, DR shall arrange to pay cost of examination and replacement. |
| 1.4 Independent Inspection Agencies | .1 | Appoint and pay for services of third-party Independent Quality Control testing laboratory and field staff including as follows:  |
|                                     | .1 | Inspection and testing required by laws, ordinances, rules, regulations, these specifications, and/or orders of public authorities.   |
|                                     | .2 | Inspection and testing performed exclusively for Contractor's convenience.  |
|                                     | .3 | Mill tests and certificates of compliance.  |
|                                     | .4 | Tests specified to be carried out by Contractor under supervision of DR.  |
|                                     | .5 | Additional tests at frequency specified as follows:   |
|                                     |    | 1. Granular Base, Subbase (Pit Run) and Crushed Granular Subbase:   |
|                                     |    | Compaction: 1 test / 50m of trail / Lift.   |
|                                     |    | Sieve: 1 test / material source / 1,000 cu.m.   |
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## 2. Culvert Trench Backfill:

Compaction: 1 test / lift/ Trench.

## 3. Hot Mix Asphalt:

Asphalt Mix: Mix design for each type of hot mix asphalt.

Marshall Test: 1 test / day.

Compaction: Nuclear density tests sufficient to establish effective rolling pattern.

Cores: 1 cores

- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by DR to verify acceptability of corrected work.
  - .3 Provide equipment required for executing inspection and testing by appointed agencies.
  - .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
  - .5 If defects are revealed during inspection and/or testing, the DR appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by DR at no cost to DR. Pay costs for retesting and reinspection.
- 1.5 Access to Work
- .1 Allow inspection/testing agencies access to Work and off-site manufacturing and fabrication plants.
  - .2 Cooperate to provide reasonable facilities for such access.
- 1.6 Procedures
- .1 Notify appropriate agency and DR in advance of requirement for tests, in order that attendance arrangements can be made and DR can co-ordinate independent Quality Assurance review and/or testing.
  - .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work. Submit test results promptly to facilitate timely QA review.
  - .3 Provide labour and facilities to obtain and handle samples and materials onsite. Provide sufficient space to store test samples.
- 1.7 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 DR as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
  - .2 Make good on Contractor's work damaged by such removals or replacements promptly.
  - .3 If in opinion of DR it is not expedient to correct defective Work or Work not
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performed in accordance with Contract Documents, the Owner may deduct from otherwise due to the Contractor the difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by DR.

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| 1.8 Reports    | .1 | Submit 1 copy (hard or electronic) of inspection and test reports to DR with all progress reports or, generally, as reports become available. |
|                | .2 | Provide copies to Subcontractor of Work being inspected or tested and to manufacturer or fabricator of material being inspected or tested.    |
| 1.9 Mill Tests | .1 | Submit mill test certificates as required of specification sections.  |

**END OF SECTION**

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equipment, work, erosion etc.).

- .6 Photograph of find, with scale in photograph if possible. In the case of suspected human remains photographs are only be permitted to be taken by the OAM, DR or PCA delegate for the purpose of confirming if the remains are human, and document and maintain chain of custody.
- .5 Be prepared to initiate work at another location under direction of the DR while archaeological testing and/or mitigation is conducted. Work may only continue in the location of the Chance Find under the direction of the OAM or DR.
- .6 In the event that a chance find is confirmed to be of found human remains, local law enforcement police will be informed by the DR or OAM. The human remains must be accorded full dignity and respect by prohibiting public access and photography. A cover will be placed over any exposed bones with plastic sheeting, blanket, or other clean covering (not back fill). If the affected location is busy or has high public visibility, a delegate of the contractor will be assigned to stand watch and secure the location until the DR is able to have a representative of the Owner relieve the contractor employee. The secured watch will continue until the OAM and local policing authorities are on site.

### 3.2 Monitoring

- .1 Monitoring may be required where Chance Finds are identified.
- .2 Site visits and/or monitoring outside of CRS, CRMZ's and SA locations may occur by the OAM and/or FNM.
- .3 Monitoring within CRS, CRMZ and SA locations will be conducted under the direction of the OAM. Prior to ground disturbance, the ground surface will be inspected by the OAM for cultural deposits or features. The ground alteration activities will be inspected while in progress. If organic soils or mineral subsoils with potential for cultural deposits are to be excavated, then a sample of those soils will be visually examined for cultural deposits. The size of the sample of soils to be inspected through raking and/or screening will be determined in the field by the OAM.
- .4 Cultural deposits identified during monitoring will be documented, photographed, and georeferenced in the field by the OAM.

### END OF SECTION

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**PART 1 - GENERAL**

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| 1.1 Section Includes                          | .1 | Temporary utilities.  |
| 1.2 Installation and Removal                  | .1 | Provide temporary utilities in order to execute Work expeditiously.   |
|   | .2 | Remove from site all such work after use.   |
| 1.3 Measurement for Payment                   | .1 | The Costs for Temporary Utilities shall be fully included in the rates tendered for Section 01 25 20 - Mobilization and Demobilization. |
|   | .2 | Payment shall be made in the amounts and at the timing as described in Section 01 25 20 - Mobilization and Demobilization.              |
| 1.4 Water Supply                              | .1 | Provide continuous temporary supply of potable water for construction use, if applicable.   |
|   | .2 | Remove or decommission temporary water supply facilities upon completion of project.  |
| 1.5 Sanitary Facilities                       | .1 | Provide sanitary facilities for construction use.   |
|   | .2 | Provide enough facilities, sanitized at a frequency suitable to meet COVID-19-specific Health and Safety Plan measures.                 |
|   | .3 | Provide hand-washing/sanitizing facilities to meet COVID-19-specific Health and Safety Plan measures.                                   |
|   | .4 | Remove or decommission temporary sanitary facilities upon completion of project.  |
| 1.6 Temporary Heating and Ventilation of Work | .1 | Provide temporary heating required during construction period, including attendance, maintenance, and fuel.                             |
|   | .2 | Construction heaters used inside buildings must be vented to outside or be flameless type. Solid fuel salamanders are not permitted.    |
|   | .3 | Provide temporary heat and ventilation in enclosed areas as required to:  |
|   | .1 | Facilitate progress of Work.  |
|   | .2 | Protect Work and products against dampness and cold.  |
|   | .3 | Prevent moisture condensation on surfaces.  |
|   | .4 | Provide ambient temperatures and humidity levels for storage and installation of materials.   |
|   | .5 | Provide adequate ventilation to meet health regulations for safe working environments.  |
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**PART 1 - GENERAL**

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| 1.1 Section Includes         | .1 | Construction aids.   |
|                              | .2 | Office and sheds.  |
|                              | .3 | Parking.   |
|                              | .4 | Project signs, static and changeable.  |
| 1.2 Installation and Removal | .1 | Provide construction facilities in order to execute work expeditiously.  |
|                              | .2 | Remove from all sites all such facilities after use.   |
| 1.3 Measurement for Payment  | .1 | Payment for items in this section shall be included in the lump sum price bid for Mobilization and Demobilization, except for project signs.   |
|                              | .2 | The unit price bid for project identification signs shall be full compensation for all work necessary and incidental for supply, installation, maintenance, and removal of the static project signs. |
|                              | .3 | Payment for the project identification signs shall be made at the lump sum price bid for this item and paid at time of installation of the signs and accepted by the DR.                             |
| 1.4 Scaffolding              | .1 | Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs as necessary to carry out Work.   |
| 1.5 Hoisting                 | .1 | Provide, operate, and maintain hoists and cranes required for moving of workers, materials, and equipment. Make financial arrangements with Subcontractors for use thereof.                          |
|                              | .2 | Hoists and cranes shall be operated by qualified operators.  |
|                              | .3 | Hoists and cranes shall be used only outside of wetted perimeters, outside riparian zones and beyond top of bank for bridge locations.   |
| 1.6 Site Storage/Loading     | .1 | Confine Work and operations of employees to only that which is required by the Contract Documents.   |
|                              | .2 | Do not unreasonably encumber premises with products.   |
|                              | .3 | Do not load or permit to load any part of Work with a weight or force that will endanger the Work.   |
|                              | .4 | Locations of heavy machinery with respect to loadings on the existing structures are the responsibility of the Contractor.   |
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| 1.7 Construction<br>Access and Parking | <ul style="list-style-type: none"><li>.1 Parking is permitted onsite provided it does not disrupt the Work.</li><li>.2 Provide and maintain adequate access to project site.</li><li>.3 Build and maintain temporary roads where indicated or directed by DR and provide snow removal during period of Work.</li><li>.4 If authorized to use existing roads for access to project sites, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.</li><li>.5 Provide road cleaning to ensure highway 4 and all other roads are kept clean from mud, dust or other debris.</li></ul>   |
| 1.8 Sanitary Facilities                | <ul style="list-style-type: none"><li>.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.</li><li>.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.</li></ul>  |
| 1.9 Offices                            | <ul style="list-style-type: none"><li>.1 Provide office heated to 22 degrees C, lighted to 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.</li><li>.2 The Contractor shall provide a site office for the exclusive use of the DR with the following:<ul style="list-style-type: none"><li>.1 The temporary office for the DR may be separate from the Contractors site office or in the same building or portable provided it can be secured from the Contractor's area by a lockable door.</li><li>.2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with minimum of two 50% opening windows and one lockable door.</li><li>.3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.</li><li>.4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood or other suitable floor finish.</li><li>.5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10 % upward light component.</li><li>.6 Provide color printer capable of printing 11" X 17" prints and cables for connection to a computer system (provided by DR) located in the DR's office.</li><li>.7 Equip office with .9 x 1.5 m table, 4 chairs, desk, 6 m of</li></ul></li></ul> |
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shelving 300 mm wide, and one 3 drawer legal size filing cabinet.

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| 1.10 Construction    | .1 | Locate project identification signs as directed by DR. See clause 1.11, below.  |
| Signage and Security | .2 | Direct requests for approval to erect a Consultant/Contractor signboard to DR. Wording shall be in both official languages.   |
|                      | .3 | Signs and notices for health, safety, traffic control, instruction, etc. shall be in both official languages. See Sections 01 35 33 - Health and Safety Requirements, and 01 35 00 - Special Procedures for Traffic Control, of these Specifications for more information.                                  |
|                      | .4 | Maintain approved signs and notices in good condition for duration of project, and dispose of on completion of project, or as directed by DR.   |
|                      | .5 | Provide signage and barriers at all access points to prevent public access to the work site. Where the Contractor has completed surfaced or unsurfaced sections of trail, immovable barriers and signage shall be provided at all access points to prevent access to the trail by pedestrians and cyclists. |
|                      | .6 | Ensure safe access to the beach is maintained at times for all existing beach accesses. Install signage and barriers to facilitate this and where necessary provide safe alternative routes and security to prevent unauthorized access into the worksite during periods of peak pedestrian access.         |
| 1.11 Project Signs   | .1 | The contractor shall supply and install 2 project signs on Highway 4 informing the public of this project. The Owner, through the DR shall provide the layout and bilingual message information for these signs.  |
|                      | .2 | Signs shall be color printed on white 12 mm Coroplast or weatherproof plywood sheets 1220mm X 2440mm, mounted on two 100mm X 100mm X 3.6m long pressure treated posts with 50mmX100mm framework.  |
|                      | .3 | Install signs true and level at the locations designated by the DR. Depth of bury shall be a minimum of 0.7 m.  |
|                      | .4 | Maintain approved signs and notices in good condition for duration of project. Signs shall be removed on completion of the project or earlier if directed by DR.  |
| 1.12 Laydown Areas   | .1 | The Contractor shall be permitted to use the following areas for offices, storage and parking, subject to approval of proposed use by the DR.   |
|                      | 1. | High Point Reservoir.   |

**END OF SECTION**

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- .4 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours, or gases in areas occupied during construction.
  - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied area.
  - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons or the environment.
  - .4 Ventilate storage spaces containing hazardous or volatile materials.
  - .5 Ventilate temporary sanitary facilities.
  - .6 Continue operation of ventilation and exhaust system for time after cessation of Work process to assure removal of harmful contaminants.
- .5 Be responsible for damage to Work due to failure in providing adequate heat, ventilation, and protection during construction.
- 1.7 Temporary Power and Light
  - .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools and for construction use.
  - .2 Arrange for connection with appropriate utility company. Pay all costs for installation maintenance and removal.
  - .3 Provide and maintain temporary lighting throughout project, if applicable.
- 1.8 Temporary Communication Facilities
  - .1 Provide and pay for temporary telephone necessary for own use.
- 1.9 Fire Protection
  - .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations, and bylaws.
  - .2 Burning rubbish and construction waste materials is not permitted onsite.

**END OF SECTION**

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**PART 1 - GENERAL**

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| 1.1 Section Includes                            | .1 | Barriers.   |
|   | .2 | Traffic Controls.   |
| 1.2 Measurement for Payment                     | .1 | The Costs for Temporary Barriers and Enclosures shall be fully included in the items requiring temporary barriers and enclosures. No separate payment shall be made.  |
| 1.3 Protection for Trees                        | .1 | Protect from damage by equipment and construction procedures. Refer to Section 01 35 43 - Environmental Procedures for further details.   |
|   | .2 | Protect from damage by equipment and construction procedures tree roots necessary for the health and survival of trees designate as protected by the DR. Refer to Section 01 35 43 - Environmental Procedures for additional information. |
| 1.4 Guard Rails and Barricades                  | .1 | Provide as required by governing authorities.   |
|   | .2 | Confirm with DR locations and installation schedule 3 days before installation.   |
| 1.5 Access to Site                              | .1 | Provide and maintain access roads as may be required for access to Work.  |
| 1.6 Public Traffic Flow                         | .1 | Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.   |
| 1.7 Fire Routes                                 | .1 | Maintain access to property for use by emergency response vehicles.   |
| 1.9 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.   |
| 1.10 Protection of Structure Finishes           | .1 | Provide protection for existing, finished and, partially finished structure finishes during performance of Work with screens, covers, and hoardings.  |
|   | .2 | Confirm with DR locations and installation schedule 3 days prior to installation.   |
|   | .3 | Be responsible for damage incurred due to lack of or improper protection.   |

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Products/Material and Equipment
- .1 Use new products/material and equipment unless otherwise specified.
  - .2 Use products of one manufacturer for material and equipment of the same type or classification unless otherwise specified.
  - .3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
  - .4 Notify DR in writing of any conflict between these specifications and manufacturer's instructions DR will designate which document is to be followed.
  - .5 Metal fastenings:
    - .1 Prevent electrolytic action between dissimilar metals.
    - .2 Use non-corrosive fasteners, anchors, and spacers for securing exterior work.
    - .3 Fastenings which cause spalling or cracking are not acceptable.
  - .6 Bolts may not project more than 1 diameter beyond nuts.
  - .7 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in Work. Store products in accordance with suppliers' instructions.
  - .8 Prevent damage, adulteration, and soiling of products during delivery, handling, and storage. Immediately remove rejected products from site.
  - .9 Store products subject to damage from weather in weatherproof enclosures.
  - .10 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.
  - .11 Touch-up damaged finished surfaces to DR's satisfaction.
  - .12 Remove and replace damaged products at own expense and to satisfaction of DR.
- 1.2 Quality of Products
- .1 Products, materials, equipment, and articles (referred to as products throughout Specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source, and quality of Products provided.
  - .2 Defective products will be rejected regardless of previous inspections.
    - .1 Inspection does not relieve responsibility but is precaution against oversight or error.
    - .2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
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- .3 Retain purchase orders, invoices, and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the DR.
  - .4 Should any dispute arise as to quality or fitness of products, decision rests strictly with DR based upon requirements of Contract Documents.
  - .5 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the site.
- 1.3 Availability of Products
  - .1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify DR of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
  - .2 If delays in supply of products are foreseeable, notify DR of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work.
  - .3 In event of failure to notify DR at commencement of Work and should it subsequently appear that Work may be delayed for such reason, DR reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.
- 1.4 Manufacturer's Instructions
  - .1 Unless otherwise indicated in Specifications, install or erect products in accordance with manufacturer's instructions.
    - .1 Do not rely on labels or enclosures provided with products.
    - .2 Obtain written instructions directly from manufacturers.
  - .2 Notify DR in writing, of conflicts between Specifications and manufacturer's instructions, so that DR may establish course of action.
  - .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes DR to require removal and re-installation at no increase in Contract Price or Contract Time.
  - .4 Provide Manufacturer's instructions and specifications to DR for review prior to any installations.
- 1.5 Contractor's Options for Selection of Products for Tendering
  - .1 Products are specified by "Prescriptive" specifications: select any product meeting or exceeding specifications.
  - .2 Products specified under "Acceptable Products": select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.
  - .3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.
  - .4 Products specified to meet particular design requirements or to match existing

- materials: use only material specified Approved Products. Alternative products may be considered provided full technical data is received in writing by DR.
- .5 When products are specified by a referenced standard or by Performance specifications, upon request of DR obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.
- 1.6 Substitution After Contract Award
- .1 No substitutions are permitted without prior written approval of the DR.
- .2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.
- .3 Proposals will be considered by the DR if:
- .1 products selected by tenderer from those specified are not available.
- .2 delivery date of products selected from those specified would unduly delay completion of Contract.
- .3 alternative product to that specified, which is brought to the attention of and considered by DR as equivalent to the product specified.
- .4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the Project. Pay for design or drawing changes required as result of substitution.
- 1.7 Transportation
- .1 Pay costs of transportation of products required in performance of Work.
- 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 DR if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. DR 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 DR, whose decision is final.
- 1.9 Coordination
- .1 Ensure cooperation of workers during Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves, and accessories.
- 1.10 Remedial Work
- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as
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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.

## PART 2 - PRODUCTS

- 2.1 Acceptable Products
  - .1 Submit product data sheets for all manufactured products used in the Work to DR for review in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Use best quality products.

**END OF SECTION**

**PART 1 - GENERAL**

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|-------------------------|----|---|
| 1.1 Section Includes    | .1 | Progressive cleaning.   |
|                         | .2 | Final cleaning.   |
| 1.2 Project Cleanliness | .1 | Maintain Work in tidy condition, free from accumulation of waste products and debris.   |
|                         | .2 | Remove waste materials from sites at regularly scheduled times or dispose of as directed by DR. Do not burn waste materials onsite.   |
|                         | .3 | Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.  |
|                         | .4 | Ensure no invasive plant species, vegetation, or seeds are brought into the Park Reserve or transported between locations within the Park Reserve. Provide only uncontaminated products for incorporation into the work. This may include using washed materials or using only clean blast rock. Machinery and equipment shall be thoroughly cleaned before delivery to the Park Reserve or between movements within the Park Reserve |
|                         | .5 | Ensure that no food waste, peelings, or wrappers are discarded on site as this may attract animals and lead to wildlife / human conflicts.  |
| 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 all waste products and debris.   |
|                         | .3 | Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.  |

**END OF SECTION**

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**PART 1 - GENERAL**

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|--------------------------------|----|---|
| 1.1 Section Includes           | .1 | Waste Management Workplan.  |
| 1.2 Definitions                | .1 | Waste Management Coordinator (WMC): Designate individual who is in attendance onsite full-time. Designate, or have designated individuals from each Subcontractor to be responsible for waste management related to their trade and for coordinating activities with WMC. |
|                                | .2 | Waste Audit (WA): Relates to projected waste generation. Involves measuring and estimating quantity and composition of waste, reasons for waste generation, and operational factors that contribute to waste.   |
|                                | .3 | Waste Reduction Workplan (WRW): Written report that addresses opportunities for reduction, reuse, or recycling of materials.  |
|                                | .4 | Materials Source Separation Program (MSSP): consists of a series of ongoing activities to separate reusable and recyclable waste materials into material categories from other types of waste at point of generation.   |
| 1.3 Documents                  | .1 | Maintain at the job site one copy of following documents:<br>.1 Waste Management Workplan (WMW).  |
| 1.4 Measurement for Payment    | .1 | The Costs for Waste Management and Disposal shall be fully included in the rates tendered for Section 01 25 20 - Mobilization and Demobilization.   |
|                                | .2 | Payment shall be made in the amounts and at the timing as described in Section 01 25 20 - Mobilization and Demobilization.  |
| 1.5 Use of Site and Facilities | .1 | Locate waste, refuse, recycling, etc. containers in locations to facilitate deposit of materials without hindering daily operations.  |
|                                | .2 | Locate separated materials in areas which minimize material damage.   |
| 1.6 Submittal                  | .1 | Submit requested submittals in accordance with Section 01 33 00 - Submittal Procedures.   |
|                                | .2 | Prepare and submit the following submittals within 15 days of the Award of Contract:<br>.1 Submit 1 hard copy of completed WMW.<br>.2 Submit 1 electronic copy (PDF) of completed WMW.  |
|                                | .3 | Provide DR with receipts indicating quantity of material delivered to landfill.   |
|                                | .4 | Provide DR with receipts indicating quantity and type of materials sent for recycling.  |
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| 1.7 Waste Management Workplan | .1 | Structure WMW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.  |
|                               | .2 | Describe management of waste.  |
|                               | .3 | Identify opportunities for reduction, reuse, and/or recycling (3Rs) of materials.  |
|                               | .4 | Post workplan or summary where workers at site can review its content.   |
|                               |    |  |
| 1.8 Waste Processing Sites    | .1 | Provide waste processing sites as applicable within the Province of British Columbia to DR within 15 days of the Award of Contract.  |
|                               | .2 | Materials and vegetation removed as part of the invasive species control program shall be disposed of outside of the Park boundary.  |
|                               |    |  |
| 1.9 Disposal of Wastes        | .1 | Burying of rubbish and waste materials is prohibited unless approved by DR at off-site locations obtained by the Contractor.   |
|                               | .2 | Burning of rubbish and waste materials is prohibited within the Park boundary. Outside of the Park burning may be restricted except as permitted by British Columbia Ministry of Forests. Permit to be obtained by the Contractor. |
|                               | .3 | Disposal of waste volatile materials, mineral spirits, oil, paint thinner, etc. into waterways or by dumping onsite is prohibited.   |
|                               |    |  |
| 1.10 Storage and Handling     | .1 | Store, materials to be reused, recycled, and salvaged in locations obtained by the Contractor and accepted by DR.  |
|                               | .2 | Unless specified otherwise, materials for removal become Contractor's property.  |
|                               |    |  |
| 1.11 Scheduling               | .1 | Coordinate work with other activities at site to ensure timely and orderly progress of the Work.   |

## PART 2 – EXECUTION

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|-----------------|----|---|
| 2.1 Application | .1 | Do work in compliance with the WMW  |
|                 | .2 | Implement MSSP for waste generated on Project in compliance with approved methods and as approved by DR.                                  |
|                 | .3 | Materials must be immediately separated into required categories for reuse or recycling.  |
|                 | .4 | Materials in separated condition: collect, handle, store onsite, and transport off-site to an approved and authorized recycling facility. |
|                 | .5 | Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.                            |
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|----------------------------|---|
| 2.2 Cleaning               | <ul style="list-style-type: none"><li>.1 Remove tools and waste materials on completion of work and leave work area in clean and orderly condition.</li><li>.2 Cleanup work area as work progresses.</li><li>.3 Source separate materials to be reused/recycled into specified sort areas.</li><li>.4 Remove any materials that spill into the forest beyond the project footprint.</li><li>.5 Remove and dispose of barrels with clay cuttings currently in place from geotechnical testing. Barrels are to be emptied on site and soils to be disposed of with other non-organic soils. Barrels to be recycled.</li></ul>   |
| 2.3 Diversion of Materials | <ul style="list-style-type: none"><li>.1 Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, to the approval of the DR and consistent with applicable fire regulations.<ul style="list-style-type: none"><li>.1 Mark containers.</li><li>.2 Provide instruction on disposal practices.</li></ul></li><li>.2 Onsite sale of salvaged, recovered, reusable, recyclable, etc. materials are not permitted.</li></ul>   |
| 2.4 Food and Food Waste    | <ul style="list-style-type: none"><li>.1 Protection and management of wildlife is a primary function of Parks Canada within the National Parks (and Park Reserves) system.</li><li>.2 To minimize conflicts between wildlife and people interaction must be restricted to all possible extents.</li><li>.3 So that wildlife does not associate people as a possible food source all food must be stored in closed vehicles and not left unattended.</li><li>.4 All waste food, peelings, bones, scraps, empty containers, wrappers and the like shall be returned to closed vehicles and removed from the Park every day so that wildlife does not become accustomed to food sources near people. Where food waste containers are temporarily used they shall be made wildlife proof and secured.</li></ul> |

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes .1 Administrative procedures preceding preliminary and final reviews of Work.
- 1.2 Inspection and Declaration .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
- .1 Notify DR in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
- .2 Request DR's Inspection.
- .2 DR's Review: DR and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Engineer's Review: Engineer, DR, and Contractor will perform review of Work to identify if Work has been completed according to the requirements of the Contract Documents. Contractor shall correct Work accordingly.
- .4 Certificate of Substantial Performance: when DR considers the Contract Work and the requirements of Contract have been substantially performed, make application for Certificate of Substantial Performance.
- 1.3 Final Completion .1 Once the Contractor has completed all Work and correction of deficiencies, they shall submit written certification to the DR that:
- .1 Contract Documents have been reviewed.
- .2 The Work shall be deemed to have reached Completion when all labour, Plant and Material required have been performed, used or supplied, and the Contractor has complied with the Contract and all orders and directions made pursuant thereto, all to the satisfaction of the Owner.
- .3 Defects are corrected and deficiencies are completed.
- .4 Work is complete and ready for Final Review.
- .1 Final Review: when items noted above are completed, request final review of Work by DR. If Work is deemed incomplete by DR, complete outstanding items and request another review.
- .2 Certificate of Completion: when DR considers deficiencies and defects have been corrected and all the requirements of Contract have been met, the Contractor shall make application for Certificate of Completion.
- 1.4 Close-Out Submittals .1 Project Record Documents specified in Section 01 33 00 – Submittal Procedures.
- .2 As-Built Documents as specified in Section 01 11 00 – General Instructions.
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- .3 Guarantees and Warranties:
    - .1 In addition to guarantee requirements contained elsewhere in the Contract Documents to which all Work of this Contract is to be guaranteed for 12 months after the date of issue of the Certificate of Completion by the DR.
    - .2 Upon completion of the Work, furnish to the PCA a guarantee in writing, stating that the Contractor will make good, at their expense, and to the satisfaction of the DR, all defects that may develop in materials and equipment used on the Work for a period of 12 months from date of Certificate of Completion, upon PCA assuming custody, that are in the opinion of the DR due to the use of improper workmanship and faulty materials and equipment.
    - .3 The Contractor is to, in the case of Work Performed by their Subcontractors and when guarantees are required, secure such guarantees from the Subcontractor and furnish them to PCA on or before the final completion of the Work.
    - .4 The guarantees are to provide that all Work furnished and installed by the guarantors are to remain in like new condition and working order for the period of 12 months and that the guarantors will replace same with new and like materials at no expense to PCA unless it can be proven that the defects are caused by abuse and negligence on the part of PCA or its employees.
    - .5 It is to be understood that in effecting the replacement, the Contractor or Subcontractor responsible is to also bear all Costs involved in removing or replacing adjacent affected materials.
    - .6 One month prior to expiry of guarantee period, the DR will carry out a detailed inspection of the Project.
    - .7 Any defect apparent will be noted and forwarded to the Contractor in writing for correction under the terms of the Contract with no additional cost to PCA.
  - .4 Commencement of Guarantee and Warranty Periods: date of DR's issuing the Certificate of Completion shall be date of commencement for warranty periods.
- 1.5 Final Payment .1 Final Payment: When DR considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by DR, complete outstanding items and request final review.

**END OF SECTION**

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**PART 1 - GENERAL**

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| 1.1 Measurement for Payment | .1 | Include all materials, labour, equipment, and services necessary for any toxic waste removal. Payments for such Work shall be paid as a Change Order to this Contract.  |
|                             | .2 | Excluded from payment is any toxic material or waste that was introduced into the Park Reserve by the Contractor's or Sub-contractor's activities.  |
|                             |    |   |
| 1.2 References              | .1 | Canadian Environmental Protection Act, CEPA.  |
|                             | .2 | Health Canada/Workplace Hazardous Materials Information System (WHMIS).   |
|                             | .1 | Material Safety Data Sheets (MSDS)  |
|                             | .3 | National Fire Code of Canada latest edition.  |
|                             | .4 | Transportation of Dangerous Goods Act (TDG Act).  |
|                             | .5 | Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).   |
|                             |    |   |
| 1.3 Definitions             | .1 | Toxic: For the purposes of this specification, a substance is considered toxic if it is listed on the Toxic Substances List found in Schedule 1 of CEPA.  |
|                             | .2 | List of Toxic Substances: found in Schedule 1 of CEPA, lists all substances that have been assessed as toxic. The federal government can make regulations with respect to a substance specified on the List of Toxic Substances. Column II of this List identifies the type of regulation applicable to each substance. |
|                             |    |   |
| 1.4 Submittals              | .1 | Product Data:   |
|                             | .1 | Submit photocopies of shipping documents and waste manifests to DR when shipping toxic wastes off-site.   |
|                             | .2 | Maintain 1 copy of product data in a readily accessible file onsite.  |
|                             | .2 | Submission Requirements:  |
|                             | .1 | Submit product data to DR in accordance with Section 01 33 00 - Submittal Procedures.   |
|                             | .2 | Express all weights and volumes in SI Metric units.   |
|                             | .3 | Accompany submissions with a transmittal letter containing:   |
|                             | .1 | Date.   |
|                             | .2 | Project title and number.   |
|                             | .3 | Contractor's name and address.  |
|                             | .4 | Identification and quantity of attached product data.   |
|                             | .5 | Other pertinent data.   |
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|-----------------------------------|--|
| 1.5 Storage and Handling          | <ul style="list-style-type: none"><li>.1 Store and handle toxic wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.</li><li>.2 Store and handle flammable and combustible wastes in accordance with current National Fire Code of Canada requirements.</li><li>.3 Coordinate storage of toxic wastes with DR and abide by internal requirements for labeling and storage of wastes.</li><li>.4 Observe smoking regulations at all times. Smoking is prohibited in any area where toxic wastes are stored, used, or handled.</li><li>.5 Report spills or accidents involving toxic wastes immediately to DR and to appropriate regulatory authorities within 24 hours of incident. Take all reasonable measures to contain the release while ensuring health and safety is protected.</li><li>.6 Transport toxic wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.</li><li>.7 Use only an authorized/licensed carrier to transport toxic waste.</li><li>.8 Coordinate transportation and disposal of toxic wastes with DR.</li></ul> |
| 1.6 Waste Management and Disposal | <ul style="list-style-type: none"><li>.1 Dispose of toxic wastes generated onsite in accordance with applicable federal and provincial acts, regulations, and guidelines.</li><li>.2 Ensure toxic waste is shipped to an authorized/licensed treatment or disposal facility and that all liability insurance requirements are met.</li></ul>   |

**END OF SECTION**

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**PART 1 - GENERAL**

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|--------------------------|----|--|
| 1.1 References           | .1 | Canadian Environmental Protection Act, CEPA.   |
|                          | .1 | Export and Import of Hazardous Waste Regulations (ETHW Regulations), SOR/2002-200.   |
|                          | .2 | Health Canada / Workplace Hazardous Materials Information System (WHMIS).  |
|                          | .1 | Material Safety Data Sheets (MSDS).  |
|                          | .3 | National Fire Code of Canada.  |
|                          | .4 | Transportation of Dangerous Goods Act (TDG Act) 1992, (c.34).  |
|                          | .5 | Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).  |
| 1.2 Definitions          | .1 | Dangerous Goods: Product, substance, or organism that is specifically listed or meets the hazard criteria established in Transportation of Dangerous Goods Regulations.  |
|                          | .2 | Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.   |
|                          | .3 | Hazardous Waste: Any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment, or disposal.  |
| 1.3 Submittals           | .1 | Submit product data in accordance with Section 01 33 00 - Submittal Procedures.  |
|                          | .2 | Submit to DR current MSDSs for each hazardous material required prior to bringing it/them onsite.  |
|                          | .3 | Submit a hazardous materials management plan to DR that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.  |
| 1.4 Storage and Handling | .1 | Coordinate storage of hazardous materials with DR and abide by internal requirements for labeling and storage of materials and wastes.   |
|                          | .2 | Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.   |
|                          | .3 | Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.   |
|                          | .4 | Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene, and naphtha for ready use. Store all flammable and combustible liquids in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the DR. |
|                          | .5 | Transfer of flammable and combustible liquids will not be carried near open flames or any type of heat-producing devices.  |
|                          | .6 | Flammable liquids having a flash point below 38 degrees Celsius, such as   |
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naphtha or gasoline will not be used as solvents or cleaning agents.

- .7 Store flammable and combustible waste liquids for disposal in approved containers located in a safe, ventilated area. Keep quantities to a minimum.
- .8 Observe smoking regulations at all times. Smoking is prohibited in any area where hazardous materials are stored, used, or handled. Cigarette butts shall be disposed of in vehicles and removed from the Park Reserve for proper disposal.
- .9 Abide by the following storage requirements for quantities of hazardous materials and wastes more than 5 kg for solids and 5 litres for liquids:
  - .1 Store hazardous materials and wastes in closed and sealed containers which are in good condition.
  - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
  - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
  - .4 Segregate incompatible materials and wastes.
  - .5 Ensure that different hazardous materials or hazardous wastes are not mixed.
  - .6 Store hazardous materials and wastes in a secure storage area with controlled access.
  - .7 Maintain a clear egress from storage area.
  - .8 Store hazardous materials and wastes in a manner and location which will prevent them from spilling into the environment.
  - .9 Have appropriate emergency spill response equipment available near the storage area, including personal protective equipment.
  - .10 Maintain an inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .10 Ensure personnel have been trained in accordance with WHMIS requirements.
- .11 Report spills or accidents involving toxic wastes immediately to DR and OEM, and to appropriate regulatory authorities within 24 hours of incident. Take all reasonable measures to contain the release while ensuring health and safety is protected.

#### 1.5 Transportation

- .1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
  - .2 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.
  - .3 If hazardous waste is generated onsite:
    - .1 Coordinate transportation and disposal with DR.
    - .2 Ensure compliance with applicable federal, provincial, and municipal
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laws and regulations for generators of hazardous waste.

- .3 Use licensed carrier authorized by provincial authorities to accept subject material.
- .4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.
- .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
- .6 Ensure that trained personnel handle, offer for transport, or transport dangerous goods.
- .7 Provide photocopy of shipping documents and waste manifests to DR.
- .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to DR.
- .9 Report discharge, emission, or escape of hazardous materials immediately to DR and appropriate provincial authority. Take reasonable measures to control release.

## PART 2 - PRODUCTS

### 2.1 Materials

- .1 Only bring onsite the quantity of hazardous materials required to perform Work.
- .2 Maintain MSDSs in proximity to where the materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

## PART 3 - EXECUTION

### 3.1 Disposal

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .2 Recycle hazardous wastes for which there is an approved, cost-effective recycling process available.
- .3 Send hazardous wastes only to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, the environment in general, or in municipal solid waste landfills is prohibited.
- .6 Dispose of hazardous wastes in a timely fashion in accordance with applicable provincial regulations.

**END OF SECTION**

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**PART 1 -  
GENERAL**

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|---|----|---|
| 1.1 Measurement and Payment             | .1 | The unit prices bid for metal work this item shall be full compensation for all work necessary and incidental for the fabrication, delivery, and installing of the various items to the lines and grades shown on the Drawings and as directed by the DR.   |
|   | .2 | Payment for metal railing shall be at the unit price bid for each type of railing. Measurement shall be by the linear metre measured along the top rail or by count for each section of railing as specific in the Table of Unit Prices. Payment will be made after the rail is accepted by the DR. |
| 1.2 References                          | .1 | ASTM International  |
|   | .1 | ASTM A325M-14, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.  |
|   | .2 | ASTM A123 Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.  |
|   | .3 | ASTM A153M-16a Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.  |
|   | .4 | ASTM A269 – 2A, Standard Specification for Seamless and welded Austenitic Stainless Steel Tubing for General Service.   |
|   | .5 | ASTM A53/A 53M 53M-02 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded, and Seamless.   |
|   | .6 | ASTM B26 – Standard Specifications for Aluminum Alloys or ASTM B108 - Standard Specifications for Aluminum Alloy Permanent Mold Castings.   |
|   | .2 | Canadian Standards Association (CSA International)  |
|   | .1 | CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.  |
|   | .2 | CAN/CSA G164-M92 (R1998) Hot Dip Galvanizing of Irregularly Shaped Articles.  |
| 1.3 Related Sections                    | .1 | Section 03 30 00 – Cast-in-place Concrete.  |
|   | .2 | Section 01 74 21 – Waste Management and Disposal.   |
| 1.4 Action and Informational Submittals | .1 | Submit shop drawings for safety railings in accordance with Section 01 33 00 - Submittal Procedures.  |
|   | .2 | Product Data:   |
|   | .1 | Submit manufacturer's instructions, printed product literature and data sheets for products and accessories and include product characteristics, performance  |
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criteria, physical size, finish and limitations.

- .3 Shop Drawings:
  - .1 Submit shop drawings for those items produced specifically for the project for review.
- 1.5 Delivery Storage and Handling
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Product Requirements and with manufacturers' 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 dry location and in accordance with manufacturer's recommendation in clean, dry, well-ventilated area.
    - .2 Store and protect steel from nicks, scratches, and blemishes.
    - .3 Replace defective or damaged materials with new.
    - .4 Exercise care during fabrication, transportation, and erection of steel products.
  - .4 Develop Construction Waste Management Plan related to Work of this section and in accordance with Section 01 35 33 – Health and Safety Requirements and Section 01 11 00 – General Instructions.
  - .5 Packaging Waste Management: remove for and return of pallets, crates, padding, packaging materials in accordance with Sections 01 11 00 – General Instructions, 01 35 33 – Health and Safety Requirements and 01 35 43 – Environmental Procedures.

## PART 2 - PRODUCTS

- 2.1 Materials
  - .1 Structural steel: to CSA G40.20/G40.21, grade types 350W – Structural Steel. All steel galvanized to 600 g/m2 to CSA-G164.
  - .2 Hollow sections: to CSA G40.20/G40.21 grade 350W class C.3
  - .3 Miscellaneous steel to CSA G40.20/G40.21 grade 300W.  
All miscellaneous steel and connection material including threaded rods, wire ropes, lag screws, bolts, nuts and washers to be galvanized to 600 g/m2 to CSA-G164.
  - .4 High strength bolts, nuts and washers: to ASTM A325M approved by DR.
  - .5 Anchor bolts, lag screws, threaded rods, washers and nuts: to CSA 040.20/040.21, grade 300W or grade A36 to ASTM F1554.
  - .6 Concrete mixes and materials to Section 03 30 00 – Cast-in-place Concrete.

## 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
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- manufacturers' written instructions.
- .2 Inform DR of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval to proceed from DR.
- 3.2 Grading .1 Remove debris and correct ground undulations along construction line to obtain a smooth uniform gradient.
- 3.3 Installation .1 Install members true to line, levels and elevations, square and plumb.  
on Ground .2 Construct continuous members from pieces of longest practical length.  
Surface .3 Excavate post holes to dimensions shown on drawings.  
.4 Space line posts as indicated on the drawings, measured parallel to the ground.  
.5 Place precast footings or posts in post holes, plumb and level fence and brace in place.  
.6 When precast footing is not used, place concrete in post holes, extending concrete 40 mm above ground level and slope to drain away from post. Concrete trucks shall not be washed out or surplus concrete disposed of within the Park Reserve boundaries.
- 3.4 Protection .1 Protect installed products and components from damage during construction.  
.2 Repair damage to adjacent works.

**END OF SECTION**

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**PART 1 - GENERAL**

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|-----------------------------|----|--|
| 1.1 Measurement and Payment | .1 | The costs for aggregates work shall be included in unit prices tendered for appropriate pay items in this Contract. No measurement will be made under this Section.  |
| 1.2 References              | .1 | ASTM D4791-19, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.  |
|                             | .2 | CSA A23.1/A23.2 [2019], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.   |
| 1.3 Samples                 | .1 | Submit samples in accordance with Section 01 33 00 – Submittal Procedures.   |
|                             | .2 | Allow sampling by third-party testing agency during production.  |
|                             | .3 | Provide third-party testing agency with access to source and processed material for sampling if requested by DR.   |
|                             | .4 | Install sampling facilities at discharge end of production conveyor, to allow third party testing agency to obtain representative samples of items being produced. Stop conveyor belt when directed by third-party testing agency to permit full cross section sampling. |
|                             | .5 | Do not stockpile material on site.   |
| 1.4 Related Sections        | .1 | Section 01 25 20 - Mobilization and Demobilization.  |
|                             | .2 | Section 01 35 00 - Special Procedures for Traffic Control.   |
|                             | .3 | Section 01 35 43 - Environmental Procedures.   |
|                             | .4 | Section 01 56 00 - Temporary Barriers and Enclosures.  |
|                             | .5 | Section 01 74 11 - Cleaning.   |

**PART 2 - PRODUCTS**

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|-------------------------|----|--|
| 2.1 Materials - General | .1 | Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.  |
|                         | .2 | Aggregates brought into the Park Reserve must be free of invasive species plant materials and seeds. Equipment used to deliver and work with aggregates must also be free of invasive species. Washing of aggregates and equipment may be required. Invasive species plant management shall be in accordance with Section 01 35 43 – Environmental Procedures. |
|                         | .3 | Flat and elongated particles of coarse aggregate: to ASTM D4791.   |
|                         | .1 | Greater dimension to exceed 5 times least dimension.   |
|                         | .4 | Fine aggregates satisfying requirements of applicable section to be one or blend of following:   |
|                         | .1 | Natural sand.  |
|                         | .2 | Manufactured sand.   |
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- .3 Screenings produced in crushing of quarried rock, boulders, or gravel.
- .5 Coarse aggregates satisfying requirements of applicable section to be one or blend of following:
  - .1 Crushed rock.
  - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
- .6 All crushed gravel when tested to ASTM C136 and ASTM C117 to conform to the following:
  - .1 Sieve sizes to CAN/CGSB-8.1.
  - .2 Crushed particles: at least 60% of particles by mass retained on 4.75 mm sieve to have at least one freshly fractured face.
- .7 A 50% blend of recycled asphalt product (RAP) will be considered for the Following products:
  - .1 Granular Base.
  - .2 Crushed Granular Sub-Base.
  - .3 Select Granular Sub-Grade Fill.

And the following conditions:

- .1 The RAP must have originated from work in Pacific Rim National Park Reserve.
  - .2 The RAP shall be crushed and blended to meet the specified gradations of the material it is supplementing.
  - .3 The RAP is free of any invasive species of plants.
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- .8 The RAP is of sufficient age that the volatile organic compounds have been oxidized from the product.

- 2.2 Pit Run Gravel .1 To be well graded granular material, substantially free from clay lumps, organic matter and other extraneous material, screened to remove all stones in excess of maximum diameter specified in material description. Material to compact to specified density and conform to following gradations:

Sieve Designation	% Passing
75mm	100
50mm	70-100
25mm	50-90
4.75mm	20-60
1.18 mm	10-40
0.300mm	4-20
0.075mm	0-5

- 2.3 Drain Rock .1 To consist of clean crushed rock conforming to the following gradations:

Sieve Designation	% Passing
25.0mm	100
19.0mm	0-100
9.5mm	0-5
4.75mm	0

- .2 Drain rock to be used only where specified on Contract Drawings. Use of drain rock other than as specified requires approval of DR after examination of soils against which drain rock will be placed. May require a geotextile separator.

- 2.4 Granular Pipe Bedding and Surround .1 Crushed stone or graded gravels to conform to the following gradations:

Sieve Designation	% Passing
25 mm	100
19 mm	90 – 100
12.5 mm	65 – 85
9.5 mm	50 – 70
4.75 mm	25 – 50
2.36 mm	10 – 35
1.18 mm	6 – 26
0.600 mm	3 – 17
0.075 mm	0 – 5

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2.5 Granular Base .1 Granular base to conform to the following properties and gradations:

.1 Crushed stone or gravel.

.2 Gradation to:

Sieve Designation	% Passing
19 mm	100
9.5 mm	50 - 85
4.75 mm	35 - 70
2.36 mm	25 - 50
1.18mm	15 - 35
0.300 mm	5 - 20
0.180 mm	-
0.075 mm	0 - 5

.3 Crushed particles: 60% of the material passing each sieve must have one or more fractured faces.

2.6 Crushed Granular Sub-Base .1 Crushed Granular Sub-base: to conform to the following:

Sub-Base

.1 Crushed rock or crushed cobble.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.1 Gradation to:

Sieve Designation	% Passing
75 mm	100
38 mm	60 - 100
19 mm	35 - 80
9.5 mm	26 - 60
4.75 mm	20 - 40
2.36 mm	15 - 30
1.18 mm	10 - 20
0.600 mm	5 - 15
0.300 mm	3 - 10
0.075 mm	0 - 5

.3 Liquid limit: to ASTM D4318, maximum 25.

.4 Plasticity index: to ASTM D4318, maximum 6.

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- .5 Crushed particles: 60% of the material passing each sieve must have one or more fractured faces.
- 2.7 Boulders
  - .1 Boulders for Stacked Boulder Facing: to conform to the following:
    - .1 Hard, durable, and angular quarry rock that will not disintegrate on exposure to water or the atmosphere. The rock will have a relative density (formally specific gravity) not less than 2.65, free from seams, cracks or other structural defects.
    - .2 Boulders are to be angular and able to interlock with adjacent boulders. Preference is to be given to flat, elongated shapes rather than more square or rounded shapes;
    - .3 Stack such that surfaces are sloping down back into the bank (i.e. not sloped to slide out towards the trail);
    - .4 Size to provide support to the exposed slope with typical configuration of larger boulders in the lower part. Boulder sizes may be reduced slightly as stacking progresses up. Minimum 0.5 m diameter with anticipated maximum size of up to approximately 1 m diameter.
    - .5 Place boulders on a geotechnically approved subgrade/granular base surface and create a well-graded, interlocking, stable mass of large boulders. Fill local voids with smaller rocks to promote long term stability as appropriate or if directed by Geotechnical Engineer.
    - .6 Ensure finished boulder layout is no steeper than specified slope.

### PART 3 – EXECUTION

- 3.1 Processing
    - .1 Process aggregate uniformly using methods that prevent contamination, segregation, and degradation.
    - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified.
    - .3 Wash aggregates, if required to meet specifications for gradation and free of invasive plant species. Invasive species plant management shall be in accordance with Section 01 35 43 – Environmental Procedures.
    - .4 Do not manufacture or deliver excessive volumes of aggregate without the approval of the DR. Types of materials and specifications may vary depending on ground conditions encountered. Materials shall not be ordered more than 3 months in advance. Variations in quantities for these materials shall be paid at the contract unit rates irrespective of the quantity variation.
  - 3.2 Handling
    - .1 Avoid segregation, contamination, and degradation of aggregate during handling and transporting.
  - 3.3 Stockpiling
    - .1 Stockpile aggregates in locations as indicated unless directed otherwise by DR. Do not stockpile on completed pavement surfaces.
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- .2 Stockpile aggregates in sufficient quantities to meet project schedules.
  - .3 Stockpile sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
  - .4 Provide compacted sand or crushed gravel base not less than 300 mm in depth to prevent aggregate contamination. Do not incorporate compacted base into work.
  - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
  - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials.
  - .7 Stockpile aggregates in piles that are maximum 1.5 m high
  - .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
  - .9 Do not cone piles or spill material over edges of piles.
  - .10 Do not use conveying stackers.
  - .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.
- 3.4 Cleaning
- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
  - .2 Leave any unused aggregates in neat compact stockpiles.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Introduction .1 The major trees within the area of the Work were felled and removed under a previous contract. The clearing work included in this Contract requires additional clearing of smaller trees and bush in the area of the Work. The clearing work included in this Contract includes clearing of all remaining felled trees, timber, brush and other organics remaining in the area of the Work.
- 1.2 Measurement and Payment .1 The unit prices bid for these items shall be full compensation for all work necessary and incidental for clearing and grubbing to the limits indicated in the Drawings and as directed by the DR. Payment shall be made at the unit prices tendered in the unit price table of the Contract.
- .2 The price bid for clearing shall include, but not be limited to: falling trees and brush and removing from site, and all other work necessary to complete this portion of the Work to the satisfaction of the DR.
- .3 The price bid for grubbing shall include, but not be limited to: excavating and disposing off site of stumps and roots to the subgrade elevation, and all other work necessary to complete the Work to the satisfaction of the DR. This will also include stumps stockpiled off site and brought back to site to act as large woody debris.
- .4 Measurement for payment for clearing shall be at the per hectare of area cleared, measured in the field, and completed to the satisfaction of the DR. Clearing of felled trees, timber, brush and other organics left on the trail alignment by the clearing contractor shall be included in the payment.
- .5 Measurement for payment for grubbing shall be at the per hectare of area grubbed, measured in the field, and completed to the satisfaction of the DR.
- .6 Measurement for payment for survey of the cleared slope area and grubbed slope area shall be lump sum. Payment at the lump sum rate tendered will be made when the digital survey is delivered to the satisfaction of the DR.
- 1.3 Definitions .1 Clearing: Cutting of trees, brushing vegetative growth to ground level and disposing of felled trees, previously uprooted trees and stumps, limbing of trees on either side of the trail, and surface debris.
- .2 Grubbing: Excavating and processing of stumps and roots located within 150 mm of the existing ground surface as described in Clause 1.2.3, above.
- .3 Chipping: Mechanically breaking down of all vegetation up to 120 mm in diameter into chips not over 100 mm long, 25 mm wide and 10 mm thick.
- .4 License to Cut: License required by Contractor under Province of BC's Forest Act that authorizes a Contractor to salvage and remove timber from Crown Land.
- .5 Merchantable Timber: Timber greater than 120 mm diameter at breast height and suitable for salvage. This material is the property of Parks Canada and shall be delivered to a location within the Park Reserve, as directed by the DR.
- .6 Amphibian Zones: Areas of the Park Reserve identified during the environmental studies as having a significant amphibian population and suitable habitat to support the amphibian populations and those areas critical to amphibian
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- migration.
- .7 Wetland: Refer to section 01 35 43 – Environmental Procedures, Clause 1.2.4..8  
Watercourse: See section 01 35 43 – Environmental Procedures, Clause 1.2.5.
- .8 Riparian Area: See Section 01 35 43 – Environmental Procedures, Clause 1.2.7.
- 1.4 Protection .1 Prevent damage to trees, site appurtenances, watercourses, root systems of trees, all natural features and artificial structures that are to remain. Particular attention should be given to protecting the cut-slope above the middle trail segment from Station 280 to 315.
- .2 Repair any damaged items to satisfaction of DR.
- .3 Protect nesting birds in accordance with Section 01 35 43 – Environmental Procedures. No clearing shall be permitted between March 12 and August 17.
- If clearing of additional trees or vegetation is required during this timeframe, then the work must be preceded with a pre-clearing nest survey completed by the OEM, in accordance with the PCA Migratory Bird Guidance and Migratory Bird Convention Act. It is the Contractor's responsibility to communicate and update the schedule and provide at least 10 days' notice of activities during this period. Due to the complexity of habitat in the Project area, the OEM has the authority to stop work or restrict clearing activities during this window if an active nest is found.
- .4 Clearing and grubbing of archaeological sites shall be in accordance with Section 01 35 44 – Cultural Resource Procedures.
- .5 Work Around and Protection of Roots:
- .1 Tree roots less than 5cm diameter of trees to be retained next to the trail exposed during grubbing should be cut cleanly with a sharp axe, tree looper or saw, and the disturbed edge covered with plastic until backfilled, or the root should be sealed with a wound dressing.
- .2 Structural tree roots greater than 5cm diameter of trees to be retained next to the trail exposed during grubbing should be hand excavated to avoid damage to roots and fabric shall be placed over exposed roots.
- .3 Avoid impacting structural/tap roots (>5 cm diameter that provide stability for the tree) and dig by hand around them if possible;
- Tree roots exposed during excavation should be cut cleanly with a sharp axe, tree looper or saw, and the disturbed edge covered with plastic or fabric until backfilled. Seal the root with wound dressing;
- Limit compaction around and over the tree roots; avoid treading on roots with heavy equipment
- .6 Additional felling of trees must be done with the OEM on site. Care must be taken to remove only those trees flagged for removal. Clearing of trees equal to or greater than 1 m DBH is not permitted unless approved by Parks Canada
- .7 In areas where old, rotted stumps (i.e., they were present prior to the onset of the Project), large logs and root wads, debris piles, etc. are found, salvages of this
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cover habitat itself will be conducted to protect and limit impacts on wildlife species using this type of habitat. Structures to retain include large (>50 cm diameter) rotten stumps, large (> 50 cm diameter, decay class 3-5) logs, and woodpiles. These should be placed away from the construction footprint of the trail but within 10 m of where they were removed. Densities of these retained structures should be at least as high as the original densities along the trail.

- 1.5 Related Sections .1 Section 01 35 43 - Environmental Procedures.  
.2 Section 01 35 44 – Cultural Resource Procedures.

PART 2 -  
PRODUCTS

- .1 Not Used.

PART 3 –  
EXECUTION

- 3.1 Sequence of Operation .1 To minimize impacts to the existing vegetation the Work shall be performed in a manner to avoid of passages of heavy equipment over roots of trees that are to remain standing, The Work shall proceed sequentially along the trail: clearing (mostly complete) grubbing, then topsoil stripping and side casting or removal, mineral soil excavation to subgrade over a short section immediately followed by placing the geotextile and root barrier, and placing of sub-grade fill and sub-base material. Trucks bringing granular fill into the trail shall be used to back haul excess soil from the site. The subgrade shall not be tracked on by machines and shall not be left exposed overnight. Survey is to be performed first before grubbing begins and then again once grubbing has been completed on slope.
- .2 During clearing, grubbing, and stripping works, the contractor must set aside and store all of the native organics that are stripped from the site, and many of the large stumps and logs to be re-used during site remediation. These items can be stored on site, space permitting, or can be temporarily stored at the High Point storage area within the Park Reserve (within 5 km of the project site)
- .3 All cut and fill slopes, as well as all trail shoulders are to be covered in minimum 15 cm of native organics, with C32BD Erosion Control Blankets (ECB) installed overtop. ECB shall be secured with hooked rebar "pins". ECB may be omitted on slopes less than 5 m in height, as directed by the Geotechnical Engineer and OEM.
- .4 Large woody debris (stumps, logs, etc.) salvaged from the site during grubbing/stripping are to be placed on top of the ECB, as directed by the Geotechnical Engineer and OEM.
- .5 Depending on the reach of machinery, slope remediation may need to be done incrementally. The contractor must plan the work stages accordingly to ensure this final step of slope remediation can be completed as intended.
- 3.2 Preparation .1 Inspect site and verify with DR, items designated to remain.
- .2 A minimum of 15 days prior to work within a section of trail the Contractor shall review the alignment for danger trees (WorkSafe BC requires trees within 1.5 tree lengths to be reviewed) and report findings to OEM and DR. PCA may require special measures as these trees often have significant wildlife value.
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- .3 The Contractor will hire a certified danger tree assessor as per Worksafe BC who will identify, or arrange to have identified, danger trees requiring falling. These trees will remain on the forest floor after falling.
  - .4 OEM must be notified by the Contractor at least 10 days prior to clearing activities to complete all necessary pre-work surveys. See environmental procedures for detailed information.
  - .5 The Contractor must clearly mark the clearing and grubbing limits in the field prior to the commencement of work. Trees identified for removal must be clearly marked.
- 3.3 Clearing
- .1 Clear work area by cutting trees and brush flush with ground, except in areas where hand clearing is required. Cut hand cleared areas to within 150 mm of ground, including brush clearance.
  - .2 Cut off branches and cut down trees overhanging cleared area as required for safety and in accordance with the Contract Documents. Trees on either side of trail shall be limbed to a height of 7 m to accommodate unloading asphalt trucks.
  - .3 Small areas of additional clearing to create local widenings of the trail may be identified by the DR.
  - .4 Trunks, branches, and vegetation up to 120 mm in diameter not retained on site is to be removed and disposed of at J. Robbins site. Timber over 120 mm diameter shall be cut to manageable lengths not less than 4m and delivered to a stockpile area within the Park Reserve identified by the DR.  
  
A portion of stumps & woody debris is to be retained on site (or at storage location) to be placed on top of organics in disturbed areas at the direction of the OEM & geotechnical engineer.
  - .5 Merchantable timber will be delivered to a location within the Park Reserve, as directed by the DR.
  - .6 Protection of remaining mature trees in the work area is critically important during construction. The Contractor must employ all possible methods to reduce impact to mature trees (>500mm) in the work area and avoid additional removals, and damage to limbs or root systems of mature trees. Any removal or modification of mature trees deemed necessary by the Contractor to complete the work must first be reviewed and approved by the Owner, OEM & DR. Removal of trees 1m diameter in size or greater will not be permitted.
- 3.4 Grubbing
- .1 Grub out stumps, roots, and embedded logs to 200mm below existing ground elevation except where lesser amount is approved by the DR.
  - .2 The OEM may designate nearby specimen trees for special protection of their root systems. The Contractor shall minimize disturbance to the root system by reducing depth of grubbing and organic removal, avoiding stump removals in the immediate area (stump grinding may be required), and avoid driving over the protected roots with large vehicles. All trees shown on "Cleared Tree Plan", drawing E-03 as being retained will require the special protection of their root systems.
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- .3 The OEM will designate large stumps to be removed and set aside for use within stream enhancement works or placed within the forest adjacent to the trail.
  - .4 Grubbed material shall be disposed of at J. Robbins site.
  - .5 Protection of amphibians – The Contractor shall make allowances during removal of stumps and large woody debris for the OEM to visually monitor for amphibians in accordance with Section 01 35 43 – Environmental Procedures.
  - .6 The truck dump piles of clearing and grubbing waste at J. Robbins site should be dumped as per direction from J. Robbins Construction Ltd. Personnel.
- 3.5 Removal and Disposal
- .1 Cut timber greater than 125 mm diameter to 4.0m to 5.0m lengths and cold-deck as required by British Columbia Ministry of Forests. Transport this material identified by the DR to a storage area within the Park Reserve. Stockpiled timber remains the property of Parks Canada.
  - .2 Removal and disposal of other clearing and grubbed material at the J. Robbins site is the responsibility of the Contractor. All organic material is to be retained within the Pacific Rim National Park Reserve.
- 3.7 Burning
- .1 Burning is not allowed within Park Reserve boundaries.
- 3.8 Finished Surface
- .1 Leave ground surface in condition suitable for stripping of topsoil.
  - .2 Provide temporary erosion protection as necessary between clearing and grubbing and stripping.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement and Payment .1 The unit prices bid for these items shall be full compensation for all work necessary and incidental for the excavation, stockpiling, re-spreading, shaping, and light compaction of organic soils to the cross sections, dimensions and grades on Drawings and as directed by the DR..
- .2 Organic materials surplus to the needs of dressing the shoulders and all of the final cut and fill slopes of the trail and identified as such at the time of excavation shall be removed and disposed of at the designated High Point storage site. This material shall be considered trail organic waste excavation and payment shall be made at the unit rate bid for that item.
- .3 The unit prices bid for organic soil stripping, stockpiling, and re-spreading shall include, but not be limited to: excavation of the organic soils, stockpiling at a designated area, management of organics in accordance with Section 01 35 44 - Cultural Resource Procedures and spreading over the work area, light compaction, final cleanup of the finished surface, and all other work necessary to complete the Work to the satisfaction of the DR.
- .4 Payment for "Organic Soils Excavation and Spreading in a Cultural Resource Sites" shall be as described in Section 01 35 44 – Cultural Resource Procedures, Clause 1.1.2.
- .5 Measurement for payment for stripping and distributing organic soils shall be per cubic metre, measured by cross section of the stockpile.
- .6 Ensure no invasive plant species, vegetation, or seeds are brought into the Park Reserve or transported between locations within the Park Reserve. Provide only uncontaminated products for incorporation into the work. This may include using washed materials or using only clean blast rock. Machinery and equipment shall be thoroughly cleaned before delivery to the Park Reserve or between movements within the Park Reserve. Costs for this work shall be included in the unit rates tendered. Existing soil that is contaminated with invasive species as determined by the OEM shall be considered waste excavation and disposed of at the J. Robbins site.
- .7 The unit price bid for placing wood chips along the trail edges and for the safety pad shall be full compensation for all work necessary and incidental for the loading, transporting, placing, shaping, surface finishing and cleanup of the wood chips. The chips will be supplied to the Contractor without charge by the Park at a location within the Park boundary for the Contractor to load.
- Measurement for payment for installation of the wood chips shall be by the cubic metre measured in place (length X width X depth) after the work is completed to the satisfaction of the DR.
- 1.2 Related Sections and References .1 Section 01 35 43 - Environmental Procedures.
- .2 Section 01 35 44 - Cultural Resources Procedures, for management of organic materials from archeological special management zones.
- .3 Section 01 74 11 - Cleaning.
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- .4 Section 31 11 00 - Clearing and Grubbing.
- .5 Section 31 24 13 - Highway & Trail Excavation, Embankment, & Compaction.
- .6 BC Ministry of Environment Standards and Best Practices for Instream Works.

PART 2 -  
PRODUCTS

Not Used

PART 3 -  
EXECUTION

3.1 Sequence of  
Operation

- .1 To minimize impacts to the existing vegetation and sensitive sub-grade, the Work shall be performed in a manner to minimize the number of passages of heavy equipment over roots of trees to be protected in the area. The Work shall proceed sequentially along the trail: clearing (mostly complete) grubbing, then topsoil stripping and side casting or removal, mineral soil excavation to subgrade over a short section immediately followed by placing the geotextile and root barrier, and placing of sub-grade material. Trucks bringing granular fill into the trail shall be used to back haul excess soil from the site. The subgrade not being tracked by machines and not left exposed overnight.
- .2 To minimize problems arising from erosion and siltation the work shall be scheduled such that the trail construction, surface finishing, and placing of erosion control blankets follow closely behind the slope shaping work.
- .3 Temporary environmental procedures must be in compliance with Federal legislation and regulations and direction from the OEM where required. Contractors shall reference the provincial MOE Standards and Best Practices for Instream Works (2004) for best management practices in sediment and erosion control during construction activities.
- .4 The Contractor shall submit a sediment and erosion control plan for the project site a minimum of ten days prior to start of work for review by the DR and the OEM. This environmental protection is incidental to the work
- .5 The DR and OEM may request changes to any plan to ensure that proposed methods for sediment and erosion control are satisfactory for the project site. No additional payment shall be made for environmental protection measures that are incidental to the work.
- .6 The Contractor shall install, maintain and remove all temporary environmental procedures as directed by the OEM and the DR.
- .7 Temporary environmental procedures, where required by the contract or as directed by the DR and OEM, are to be installed prior to starting any construction activities to prevent sediment from entering any waterway, within the vicinity of the construction site.

3.2 Preparation

- .1 The Contractor shall confirm with DR if the area to be to be stripped falls within a Cultural Resources Management area before starting stripping work.
  - .2 OEM must be notified by the Contractor at least 10 days prior to trail stripping activities to complete all necessary pre-work surveys. See environmental
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procedures for detailed information.

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| 3.3 Temporary<br>Erosion and<br>Sedimentation Control | .1 | Temporary erosion and sedimentation control shall be carried out in accordance with Section 01 35 43 - Environmental Procedures.   |
|   | .2 | To reduce problems with silts entering watercourses in the future the topsoil and organics stockpiled for re-spreading shall not be contaminated with underlying silts and clays.  |
|   | .3 | Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent areas, that complies with EPA 832/R-92-005.   |
|   | .4 | Inspect, repair, and maintain erosion and sedimentation control measures during construction until work is complete and accepted by the DR.  |
|   | .5 | Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.  |
| 3.4 Stripping of<br>Organic Soils                     | .1 | Ensure that procedures are conducted in accordance with applicable environmental requirements of these specifications.   |
|   | .2 | Complete clearing and grubbing of the area prior to organic stripping.   |
|   | .3 | Do not contaminate organic soils that are going to be reused with mineral subsoils. Organic soils include litter-fibric-humic (LFH) layer and the upper mineral A horizon, topsoil. Mineral subsoil includes gravel, sand, clay, and silts.  |
|   | .4 | Situate the stockpiled material such that it does not interfere with local drainage patterns or with trail construction. Do not stockpile on undisturbed forest floor. Excavated soil and subsoil must be stockpiled within an area approved for Project use and at least 30 m away from any drainage features, drains, ditches, and 50 m from any waterbody or water course. If soil must be stockpiled closer than outlined, a plan is to be discussed and approved by OEM and DR before soil is stockpiled. Protect stockpiles from contamination and compaction. |
|   | .5 | Topsoil from areas adjacent to roads and highways that is contaminated with invasive species shall be disposed off-site when directed by the OEM and DR.   |
|   | .6 | Notify DR and OEM immediately of suspected soil/fill contamination; chemical, petroleum or unusual odour; unusual debris such as metal, plastic, glass or demolition waste; dark or unusual staining. (Typically, stained soils are darker and may have a “wet” appearance but should not be confused with naturally occurring organic soils. Stained soils may have a distinct oily feel and typically are accompanied by odours). Segregate suspect soils and handle separately from other materials.  |
|   | .7 | During clearing, grubbing, and stripping works, the contractor must set aside and store all of the native organics that are stripped from the site, and many of the large stumps and logs to be re-used during site remediation. These items can be stored on site, space permitting, or can be temporarily stored at the High Point storage area within the park (within 5 km of the project site).   |
|   | .8 | Stockpiles may be located onsite, but must be pre-approved by OEM and DR.  |
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Soils may be piled in spots that will be disturbed within the footprint but shall not be located in the forest outside of the project footprint without approval by the OEM and DR.

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|  | .9  | Pile topsoil and forest organic litter with mechanical hoe alongside the proposed trail where possible as directed by OEM and DR. These piles will generally be in the form of small windrows on both sides of the trail and tight to the excavation to minimize impacts on the adjacent undisturbed ground. This will also facilitate re-spreading the material on the new shoulders of the trail. Approximately 0.1 cu.m to 0.2 cu.m of material is required per linear meter of trail edge for each side of the trail across level ground, but more will be required where cross slopes or significant cuts and fills are encountered. Larger volumes of topsoil and forest organic litter may only be windrowed if approved by the OEM and DR. |
|  | .10 | For trees located next to the trail that are to be retained and whose roots are exposed during topsoil stripping, structural tree roots greater than 5cm diameter shall be hand excavated to avoid damage to roots and fabric shall be placed over exposed roots.  |
| 3.5 Stripping of Organic Soils Within Archeology Sites | .1  | In addition to the requirements of the above clause 3.2 the following shall apply to organic soils within the archeology sites identified by the DR. During the progress of this work the OEM shall be present to observe and assist with placing the material.  |
|  | .2  | Organics shall be removed from the archeology site and deposited a maximum of about 6 metres into the adjacent forest.   |
|  | .3  | The material deposited into the forest shall be spread to a maximum depth of 200 mm. Spreading of this material can be aided by the excavation equipment 'sprinkling' the organics while depositing it and re-spreading it after deposit. The equipment tracks must remain within the clearing limits. Where the arm can reach into the forest without damage to trees, machine spreading is permitted. Manual spreading shall be used to obtain the final thickness.  |
|  | .4  | Maintain existing drainage patterns. Do not deposit materials into water or bury growing plants. Do not deposit materials in Amphibian areas except as directed by OEM.  |
|  | .5  | Refer to Section 01 35 44 - Cultural Resources Procedures, for additional details regarding working in archeological special management zones and chance finds.  |
| 3.6 Preparation of Shoulders                           | .1  | After trail structure is in place (excavation, installation of the geotextile (if required), root guard (if required), subbase, and base) the shoulders shall be prepared.   |
|  | .2  | Grade shoulders of trail establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage. The prepared surface shall not deviate by more than 50 mm over a 1.0 m distance.  |
|  | .3  | Verify that grades are acceptable. Notify DR and receive acceptance or make corrections to the grades as directed by DR.   |
| 3.7 Re-spreading of Organic Soils                      | .1  | Re-spread organics and topsoil after DR has accepted base course. The re-spreading shall take place as soon as practical after the sub-base and base is completed to minimize self-compaction of the topsoil and to minimize damage of   |
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areas used for temporary stockpiling of the material. Spread topsoil during dry conditions in a uniform layer over unfrozen subgrade free of standing water.

- .2 Lightly compact the finished area to minimize future settlement of the surface.
- .3 After lightly compacting the organic soil, place any required erosion and sedimentation controls needed, including erosion control blankets, and restore and stabilize areas disturbed.
- .4 All cut and fill slopes, as well as all trail shoulders are to be covered in minimum 15 cm of native organics, with C32BD Erosion Control Blankets (ECB) installed over top. ECB shall be secured with hooked rebar "pins". ECB may be omitted on slopes less than 5 m in height, as directed by the Geotechnical Engineer and OEM.
- .5 Large woody debris (stumps, logs, etc.) salvaged from the site during grubbing/stripping are to be placed on top of the ECB, as directed by the Geotechnical Engineer and OEM. Depending on the reach of machinery, this slope remediation may need to be done incrementally. The contractor must plan the work stages accordingly to ensure this final step of slope remediation can be completed as intended.
- .6 Soil respreading and contouring will be done under the direction of the OEM.
- .7 Placing, shaping, surface finishing and cleanup of the wood chips along the trail edges and for the safety pad shall be completed per tender drawings and to the satisfaction of the DR.

**3.8 Cleaning**

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

**END OF SECTION**

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**PART 1 - GENERAL****1.1 Measurement and .1  
Payment**

The invert of the proposed culverts shall generally not exceed the diameter of the culvert plus 300 mm below existing ground. Pipe bedding shall be 150 mm below the invert. No separate payment will be made for excavation, trenching, and backfilling within this depth. These items shall be included in the unit priced items incorporating this into their work.

.2 Where the invert of the culvert exceeds the diameter of the culvert plus 300 mm below existing ground, or pipe bedding exceeding 150 mm is required and authorized by the DR, separate payment will be made for excavation, trenching, and backfilling exceeding this depth. Payment will include the excavation and disposal of the additional material, supply, placement, and compaction of imported granular bedding or backfill material, and all other labor, materials, and equipment to complete the work.

.3 Measure for payment where culvert inverts exceed the diameter of the culvert plus 300 mm below existing ground will be by the cubic metre as measured in place and agreed by DR.

.4 No extra payment will be made for excavating unnecessarily beyond lines shown on the drawings.

**1.2 References**

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

.1 ASTM C 117, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D 422, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D 698-00a1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ) (600 kN-m/m ).

.5 ASTM D 1557-02e1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ) (2,700 kN-m/m ).

.6 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA):

.1 CAN/CSA-A3000, Portland Cement.

.2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.

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- .4 Ministry of the Environment (MOE):
- .1 Standards and Best Practices for In Stream Works, 2004.
- 1.3 Definitions .1 Excavation classes: two classes of excavation will be recognized: common excavation and rock excavation.
- .1 Rock: material from solid masses of igneous, sedimentary or metamorphic rock that, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort from Caterpillar D9L or equivalent to be considered integral with parent mass. Boulder or rock fragments measuring in volume one cubic metre or more.
- .2 Common excavation: excavation of materials of whatever nature, that are not included under definitions of rock excavation.
- .2 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping, and seeding.
- .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .4 Borrow material: material obtained from locations outside area to be graded and required for construction of fill areas or for other portions of Work.
- .5 Unsuitable materials:
- .1 Weak and compressible materials under excavated areas.
- .2 Frost susceptible materials under excavated areas.
- .3 Frost susceptible materials:
- .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.2.
- .2 Table:
- | <u>Sieve Designation</u> | <u>% Passing</u> |
|--------------------------|------------------|
| 2.00 mm                  | 100              |
| 0.10 mm                  | 45 – 100         |
| 0.02 mm                  | 10 – 80          |
| 0.005 mm                 | 0 – 45           |
- .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- 1.4 Construction Sequencing & Temporary Excavation .1 Engage services of qualified Professional Engineer who is registered or licensed in Province of British Columbia, Canada in which Work is to be carried out to design and inspect shoring, bracing, and temporary excavation slopes required for Work if required by applicable legislation.
- .2 Submit shop drawings in accordance with Section 01 33 00 – Submittal
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		Procedures.
	.3	At least 5 weeks prior to performing Excavation, Trenching, or Backfilling Work, Contractor to provide DR with a Construction Sequence for the Work. Do not proceed with the Work until approval has been received from the DR.
1.5 Waste Management and Disposal	.1	Dispose of waste materials in accordance with Section 01 74 21 - Waste Management and Disposal and the Waste Management Work Plan.
1.6 Protection of Existing Features	.1	Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
	.2	Existing surface features: <ul style="list-style-type: none"><li>.1 Conduct, with DR, condition survey of existing trees and other plants, survey benchmarks and monuments which may be affected by Work.</li><li>.2 Protect existing surface features from damage while Work is in progress. In event of damage, immediately make repair to approval of DR.</li><li>.3 Where required for excavation, cut roots or branches as approved by DR.</li></ul>
1.7 Related Sections	.1	Section 01 35 43 - Environmental Procedures.
	.2	Section 01 35 44 – Cultural Resource Procedures.
<b><u>PART 2 - PRODUCTS</u></b>		
2.1 Materials	.1	Granular bedding to Section 31 05 16 – Aggregates.
	.2	Trench Backfill to Section 31 05 16 – Aggregates and Section 32 11 16 – Granular Sub-base.
<b><u>PART 3 - EXECUTION</u></b>		
3.1 Preparation	.1	The Contractor shall confirm with DR if the area to be excavated falls within a Cultural Resources Management area before starting excavation work. If so, work will be carried out under the observation of OAM.
	.2	The Contractor shall confirm with DR if the area to be excavated falls within a sensitive wetland or riparian area before starting excavation work. If so, the work will be carried out under the observation of the OEM.
	.3	Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
3.2 Stripping of Topsoil	.1	Strip topsoil at culvert locations when stripping the Work site.
	.2	Refer to Section 31 14 13 – Trail Work Soil Stripping, Stockpiling, and Re-spreading for additional information and requirements
3.3 Stockpiling	.1	Stockpile fill materials in areas designated by DR. Stockpile granular materials in manner to prevent segregation. Refer to Section 31 14 13 – Trail Work Soil Stripping, Stockpiling, and Re spreading for additional information and requirements.

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|   | .2 | Stockpile topsoil and subsoil (the non-organic material below the topsoil) materials separately. Protect fill materials from contamination.  |
| 3.4 Cofferdams, Shoring, Bracing and Underpinning | .1 | Construct temporary Works to depths, heights, and at locations as required to protect existing structures, embankment slopes, roadway embankment fill, trees etc. Where required (ie. for works on the main slope), temporary works are to be designed and stamped by a Professional Engineer registered in the Province of British Columbia.  |
|   | .2 | During backfill operation:   |
|   | .1 | Unless otherwise as indicated or as directed by DR, remove sheeting and shoring from excavations.  |
|   | .2 | Do not remove bracing until backfilling has reached respective levels of such bracing.   |
|   | .3 | Pull sheeting in increments that will ensure compacted backfill is maintained at an elevation at least 500mm above toe of sheeting.  |
|   | .3 | When sheeting remains in place, cut off tops at elevations as indicated.   |
| 3.5 Dewatering and Heave Prevention               | .1 | Keep excavations free of water while Work is in progress.  |
|   | .2 | If construction requires flow isolation or in-stream works, submit a flow isolation and in-stream work plan for each project site requiring flow isolation and/or in-stream works a minimum of ten days prior to the work commencing for the DR and OEM's review. Plan to include, but not be limited to details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs, if required. |
|   | .3 | Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.   |
|   | .4 | Protect open excavations from flooding and damage due to surface run-off.  |
|   | .5 | Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in manner not detrimental to public and private property or any portion of Work completed or under construction.   |
|   | .6 | Allow sufficient time for OEM to salvage fish and amphibians in accordance with Section 01 35 43 - Environmental Procedures.   |
|   | .7 | Provide silt fences, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to water courses or drainage areas.   |
| 3.6 Excavation                                    | .1 | Excavate to lines, grades, elevations and dimensions as indicated on the drawings or as required. Note that planting benches are to be created on final slopes as shown on Environmental drawings as approved by the OEM and DR.   |
|   | .2 | Culvert inverts shall generally not exceed the diameter of the culvert plus 300 mm below existing ground.  |
|   | .3 | Excavation work to be as minimal as possible.  |
|   | .4 | <u>Excavation must not interfere with capacities of adjacent foundations, utilities</u>  |
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and roadway fills. It is the Contractor's responsibility to determine if any temporary works are required to maintain stabilities during construction.

- .5 Minimize disturbance of soil within branch spread of trees or shrubs that are to remain. If excavating through larger roots, cut roots with sharp axe or saw.
- .6 Dispose of surplus and unsuitable excavated material in an off-site location.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .9 Notify DR when bottom of excavation is reached.
- .10 Obtain DR approval of completed excavation.
- .11 Correct unauthorized over-excavation by filling over-excavation with drain rock at Contractors cost.
- .12 Hand trim, make firm, and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

### 3.7 Backfilling

- .1 Do not proceed with backfilling operations until DR has approved.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material that is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness (maximum 150mm compacted thickness at highway crossing) up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Place layers simultaneously at both sides of pipe culverts to equalize loadings. Difference not to exceed 0.3m from one side to the other.
  - .3 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
    - .1 If approved by DR, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by DR.
- .6 Care must be taken next to existing structures and next to new structures when performing backfilling operations.

### 3.8 Finishing and Protection

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 - Waste Management and Disposal, trim slopes, and correct defects as directed by DR. Finishing and Protection shall be in accordance with Section 31 24 13 – Highway & Trail Excavation, Embankment & Compaction.

**END OF SECTION**

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**PART 1 - GENERAL****1.1 Measurement and .1  
Payment****Payment for excavation:**

- .1 “Waste excavation” shall be full compensation for all work necessary and incidental for excavation and disposal of surplus, unsuitable and waste materials including site drainage, and all other related surface works within limits of the Work, and as indicated, to the required subgrade elevations for the construction of trail and road works and related facilities.
- .2 Measurement for payment for trail excavation shall be by the cubic metre and calculated using surveyed cross sections of the excavation as accepted by the DR.
- .3 Payment for “Mineral Soil Excavation and Fill in Cultural Resource Sites” shall be as described in Section 01 35 44 – Cultural Resource Procedures, Clause 1.1.4.4. Surplus contaminated organics, generally roadside materials, and surplus mineral excavation shall be disposed of outside of the Park Reserve at sites arranged and paid for by the Contractor.
- .5 Surplus organic excavation not contaminated with invasive species of plants will remain within the Park Reserve boundaries as directed by the DR.

**.2 Payment for embankment fill and sub grade fill:**

- .1 “Embankment Fill” shall be full compensation for all work necessary and incidental for excavating, hauling, placing, grading, and compacting approved excavation material from approved subgrade to the underside of granular sub-base within the Work site, for the construction of the trail as indicated in the Contract Documents.
  - .2 Subgrade elevation for the trail shall be adjusted in the field to provide a finished trail surface with 2% cross fall and a profile providing vertical curves with deviation from straight of not more than 80 mm over a distance of 2 metres, minus pavement structure in accordance with the Contract Document and as directed by the DR.
  - .3 Payment for Contractor supplied subgrade fill shall include, but not limited to: supplying, hauling, placing and compacting of granular material to finished subgrade elevation for construction of all surface works, and protection of the placed material to reasonably prevent such events that may affect the performance of the subgrade.
  - .4 Measurement for payment for embankment fill shall be by the cubic metre of compacted embankment placed (length X width X depth) or surveyed cross section to the specified density as accepted by the DR.
  - .5 Measurement for payment of this item will be at the unit price for each cubic metre based on ‘in-place’ measurements using average end area method and accepted by the DR.
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	.6	Quarries and gravel supplies shall be arranged and paid for by the Contractor.
1.2 References	.1	ASTM D1557-02el., Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2,700 kN-m/m <sup>3</sup> ))
1.3 Definitions	.1	Rock Excavation: excavation of: <ul style="list-style-type: none"><li>.1 Material from solid masses of igneous, sedimentary or metamorphic rock that, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort from Caterpillar D9L or equivalent to be considered integral with parent mass.</li><li>.2 Boulder or rock fragments measuring one cubic metre or more.</li></ul>
	.2	Common Excavation: excavation of materials that are not Rock Excavation or Stripping Excavation.
	.3	Stripping Excavation: excavation of organic material covering original ground.
	.4	Embankment Fill: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.
	.5	Waste material: material other than Stripping Excavation that is unsuitable for embankment construction or material surplus to requirements.
	.6	Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping, and seeding.
	.7	Road Reclamation: excavation of existing roadbed materials deemed acceptable for use as Embankment.
	.8	Subgrade Elevation: elevation of undisturbed native material after organics are removed and mineral soil is cut to desired depth prior to placing fill.
	.9	Mineral Subsoil: Boulders, cobbles, gravel, sand, clay, and silts.
	.10	Organic Soils: Litter-fibric-humic (LFH) layer and upper mineral A horizon topsoil.
	.11	Sub Grade Fill: imported material placed above original ground or stripped surface up to top of subgrade
1.4 Requirements of Regulatory Agencies	.1	Adhere to Provincial and Federal Environmental requirements if potentially toxic materials are involved.
1.5 Waste Management and Disposal	.1	Separate and recycle waste materials in accordance with Section 01 74 21 – Waste Management and Disposal.
1.6 Related Sections	.1	Section 01 35 43 - Environmental Procedures.
	.2	Section 01 35 44 – Cultural Resource Procedures.

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**PART 2 –  
PRODUCTS**

- |                         |    |  |
|-------------------------|----|--|
| 2.1 Materials           | .1 | Granular materials in accordance with Section 31 05 16 – Aggregates.   |
|                         | .2 | Geosynthetic material in accordance with Section 31 32 19 – Geotextiles.   |
| 2.2 Specified Materials | .1 | Embankment materials require approval by the DR.   |
|                         | .2 | Embankment may be:   |
|                         | .1 | Approved native or imported granular material not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps, or any other unsuitable material. |
|                         | .2 | Pit run gravel.  |
|                         | .3 | Road reclamation meeting the pit run gravel specification.   |
|                         | .4 | Crushed Granular Subbase   |

**PART 3 -  
EXECUTION**

- |                           |    |  |
|---------------------------|----|--|
| 3.1 General               | .1 | The Contractor shall confirm with DR if the area to be excavated falls within a Cultural Resources Management area before starting excavation work.  |
|                           | .2 | Clear and grub to the limits of excavation and/or embankment fill in accordance with Section 31 11 00 - Clearing and Grubbing.   |
|                           | .3 | Provide suitable temporary ditches or other suitable means of handling drainage prior to excavation and during construction to protect the construction area   |
|                           | .4 | Comply with Section 01 35 43 - Environmental Procedures.   |
|                           | .5 | The subgrade profile for the trail may be adjusted in the field to provide a finished trail surface with 2% cross fall and a profile providing vertical curves with deviation from straight of not more than 80 mm over a distance of 2 metres.  |
|                           | 6. | To minimize problems arising from erosion and siltation the work shall be scheduled such that the trail construction, surface finishing, and placing of erosion control blankets follow closely behind the earth work.   |
| 3.2 Sequence of Operation | .1 | To minimize impacts to the existing vegetation the Work shall be performed in a manner to minimize the number of passages of heavy equipment over the subgrade in any given area. The Work shall proceed sequentially along the trail: clearing, grubbing, then topsoil stripping and side casting or removal, mineral soil excavation to subgrade over a short section immediately followed by placing of combi-grid, sub-grade fill (Crushed Granular Subbase or Pit Run) material, followed by sub-base material (Crushed Granular Subbase or Pit Run). Trucks bringing granular fill into the trail shall be used to back haul excess soil from the site. The subgrade not being tracked by machines and not left exposed overnight. |
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- 3.3 Stripping for Roadworks
- .1 Commence topsoil stripping of areas as indicated after brush, weeds and grasses have been removed from these areas.
  - .2 Strip to depths as indicated or as necessary to remove organic material.
  - .3 Set aside sufficient topsoil to dress the slopes upon completion of the earthworks.
  - .4 Do not mix topsoil with subsoil.
  - .5 Topsoil from areas adjacent to roads and highways is often contaminated with invasive species and shall be disposed off-site when directed by the DR. Non-contaminated topsoil shall be disposed of at the designated Tofino Airport site.
  - .6 Prevent clearing and grubbing debris from mixing with stripped topsoil.
  - .7 Upon completion of excavation and embankment construction spread stripped topsoil on slopes and trimmed to not more than 50 mm deviation over 1.0 m, as directed by the DR.
- 3.4 Stripping for Trail Works
- .1 Refer to Section 31 14 13 - Topsoil Stripping, Stockpiling, and Re-spreading.
- 3.5 Excavating
- .1 General:
    - .1 Notify DR when unsuitable materials are encountered. Remove to depth and extent directed by DR.
    - .2 To minimize impacts to the existing subgrade, the Work shall be performed in a manner to minimize the number of passages of heavy equipment over the sub-grade in the area.
    - .3 Equipment must not track on exposed subgrade.
  - .2 Maintain profiles, crowns and cross slopes to provide good surface drainage.
  - .3 Rock Excavation:
    - .1 If, during excavation, material appearing to conform to classification for rock is encountered, notify DR and provide sufficient time to take measurements to determine volume of rock.
    - .2 Shatter rock to 300mm below subgrade elevation or as indicated on plans, if required.
  - .4 Work Around and Protection of Roots:
    - .1 Tree roots less than 5cm diameter exposed during excavation should be cut cleanly with a sharp axe, tree looper or saw, and the disturbed edge covered with plastic until backfilled, or the root should be sealed with a wound dressing.
    - .2 Structural tree roots greater than 5cm diameter exposed during excavation should be hand excavated to avoid damage to roots and fabric shall be placed over exposed roots.
  - .5 Disposal of all unsuitable and/or surplus material shall be outside the limits of Pacific Rim National Park Reserve unless approved by the DR.
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- 3.6 Inspection of Subgrade
- .1 Prior to placing any fill materials, the subgrade shall be reasonably free of organics to the DR's satisfaction.
  - .2 Remove soft or other unsuitable material or mitigate using other techniques as directed by DR.
  - .3 The DR may direct the Contractor to replace the soft or unsuitable material with course crushed aggregate and geotextiles. Payment will be made under the appropriate contract items.
- 3.7 Placing
- .1 Place material only on clean unfrozen surfaces, properly shaped and compacted, free from snow and ice and approved by the DR.
  - .2 Maintain sloped surface during construction to ensure that surface water runs off the grade as work proceeds.
  - .3 Drain low areas before placing materials when approved by the OEM.
  - .4 Place materials using methods which do not lead to segregation or degradation to the full width in uniform layers and compacted to specified densities.
  - .5 Bench existing slopes in side hills, fill slopes, and sloping sections as shown on the Drawings to ensure proper bond between new materials and existing surfaces.
  - .6 On roadways place and compact to full width in layers not exceeding 200 mm loose thickness. DR may authorize thicker lifts if specified compaction can be achieved. On trails place and compact to full width in layers not exceeding 300 mm if specified density can be achieved.
  - .7 Where material consists of rock:
    - .1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case, is layer thickness to exceed 500 mm subject to approval of Owner's geotechnical engineer.
    - .2 Carefully distribute rock material to fill voids with smaller fragments to form compact mass.
    - .3 Fill surface voids at subgrade level with rock spalls or selected material to form an earth-tight surface.
    - .4 Do not place boulders and rock fragments with dimensions exceeding 150mm within 300mm of subgrade elevation.
  - .8 Embankments to be sloped to DR's requirements. Intent is that slopes be as gentle as possible within limitations of site geometry.
-

- 3.8 Compaction
- .1 Compaction equipment must be capable of obtaining required densities in materials on project. Equipment that does not achieve specified densities must be replaced or supplemented.
  - .2 Break material down to sizes that enable required compaction and mix for uniform moisture to full depth of layer.
  - .3 On highway work, compact each layer to minimum 95% maximum dry density, to ASTM D1557.
  - .4 On trail work, compact each layer to minimum 95% maximum dry density, to ASTM D1557 and ASTM D4718.
  - .5 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction or remove material.
  - .6 Refer to WSP Geotechnical Report dated February 2021 (Appendix A) for comments regarding compaction on sensitive subgrades. The report is provided for reference only and does not constitute a part of the specifications.
- 3.9 Finishing
- .1 Shape entire trail or roadbed to within 25mm of design elevations and to DR's satisfaction.
  - .2 Finish slopes and ditch bottoms to neat condition, true to lines, grades and drawings where applicable.
  - .3 Remove rocks over 150mm in any dimension from slopes and ditch bottoms.
  - .4 Hand finish slopes that cannot be finished satisfactorily by machine.
  - .5 Round top of backslope 1.5 m on both sides of top of slope.
  - .6 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags, ruts, and protruding stones.
  - .7 The Contractor shall be responsible for all labour, equipment and materials costs associated with repairing the roadbed which has been left exposed prior to paving, including but not limited to any roadbed left exposed over the winter months or during other periods of heavy rainfall or unauthorized use of the trail by the public.
- 3.10 Protection
- .1 Maintain finished surfaces in condition conforming to this Section until placement of subsequent materials.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes .1 Materials and installation of polymeric geotextiles used in revetments, breakwaters, retaining wall structures, filtration, drainage structures, erosion and silt control, roadbeds and trail beds purpose of which is to:
- .1 Separate and prevent mixing of granular materials with the native sub-grade.
  - .2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure.
  - .3 Provide additional strength to sub-grade.
  - .4 Protect tree roots.
  - .5 Control erosion and siltation.
- .2 Materials and installation of 100% biodegradable geotextiles used to reduce erosion of the finished landscape surface due to wind and water movement.
- 1.2 Measurement and Payment .1 The unit prices bid for these items shall be full compensation for all work necessary and incidental for the supplying and placing geotextiles to the lines, grades and cross-sections indicated in the Drawings and as directed by the DR.
- .2 The prices bid shall include, but not be limited to: supply and installation of geotextiles, retaining pins, and trenches, if required, overlaps, and all other work and materials necessary to complete this portion of the Work to the satisfaction of the DR.
- .3 The prices bid for erosion control blankets shall include, but not be limited to: supply, installation of the blanket over the finished exposed ground surfaces, cutting around obstacles, and maintaining the coverage for the duration of the contract to the satisfaction of the OEM and DR. Measurement for payment relates only to permanent erosion control blankets. Temporary erosion control blankets are covered by Section 01 35 43 – Environmental Procedures.
- .4 Measurement for payment for the above items shall be per square metre (length X width) of geotextile installed, as measured in place, and accepted by the DR. Overlap, as specified by supplier, is considered incidental in the payment item.
- .5 The prices bid for silt fencing shall include, but not be limited to: supply, cutting blankets to various lengths, and installation of the fencing and digging into the ground surfaces as specified, going around obstacles, and maintaining the fencing for the duration of the contract to the satisfaction of the OEM and DR. Refer to Section 01 35 43 – Environmental Procedures for additional information. Measurement for payment shall be per linear metre for each type of fencing installed and maintained as measured in the field and accepted by DR.
- .6 TE-UX20 PET Uniaxial geogrid and C32BD ECB quantities will be supplied by Parks to the contractor. The contractor will be responsible for collection of said materials from the Parks maintenance yard at the Tofino Airport.
-

- 1.3 References
- .1 American Society for Testing and Materials International, (ASTM)
    - .1 ASTM D4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
    - .2 ASTM D4595-86(2001), Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
    - .3 ASTM D4716-01, Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
    - .4 ASTM D4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-4.2 No. 11.2- [M89(April 1997)], Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
    - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
      - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
      - .2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
      - .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
      - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
      - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
  - .3 Canadian Standards Association (CSA International)
    - .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
    - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- 1.4 Submittals
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit to DR following samples at least 4 weeks prior to beginning Work.
    - .1 Minimum length of 2 m of roll width of geotextile.
    - .2 Minimum of 1 m seam with at least 300 mm of geotextile on both sides of seam.
  - .3 Submit to DR copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.
-

- 1.5 Delivery and Storage .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.
- 1.6 Waste Management and Disposal .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.
- .2 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

## PART 2 - PRODUCTS

- 2.1 Material .1 Non-Woven Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
- .1 Composed of: minimum 85% by mass of polypropylene or polyester.
- .2 Physical properties of non-woven geotextile:
- | Property                | Test Method | Unit             | Minimum Average Roll Value (M.A.R.V.) |
|-------------------------|-------------|------------------|---------------------------------------|
| Minimum Thickness       |             | mm               | 1.5                                   |
| Mass per Unit Area      | ASTM D5261  | g/m <sup>2</sup> | 200                                   |
| Grab Tensile Strength   | ASTM D4632  | N                | 700                                   |
| Grab Tensile Elongation | ASTM D4632  | %                | 50                                    |
| CBR Puncture            | ASTM D6241  | N                | 1825                                  |
| Trapezoidal Tear        | ASTM D4533  | N                | 260                                   |
| UV Degradation          | ASTM D4355  | % / 500 hrs      | 70                                    |
| Apparent Opening Size   | ASTM D4751  | mm               | 0.21 (max)                            |
- .3 Based on general physical properties of non-woven geotextiles outlined above, equivalent geotextiles would be: Titan TE-6 or approved equal.
- .2 Biaxial Geogrid:
- .1 Composed of: 100% by polypropylene, open grid, biaxial orientation, free of striations, roughness, pinholes, blisters, undispersed raw materials or any sign of contamination by foreign matter.
- .2 Supplied in rolls, minimum 4 metres in width.
- .3 Mass / Unit Area: 280 g/m<sup>2</sup>
- .4 Tensile Strength at 2% Strain (ASTM D6637): 8.5 kN/m (MARV).
- .5 Flexural Rigidity (ASTM D7748): 1,000,000 mg-cm
-

- .6 UV Degradation (ASTM D4355): 70% / 500 hours.

Based on general physical properties outlined above, equivalent biaxial geogrids would be Titan TE-BX20PP, or approved equal.

- .3 Composite Non-Woven Geotextile and Biaxial Geogrid:

- .1 Composed of: 100% polypropylene, open grid, biaxial orientation, free of striations, roughness, pinholes, blisters, undispersed raw materials or any sign of contamination by foreign matter (biaxial grid) bonded to a non-woven, polyester, geotextile.
- .2 Supplied in rolls, minimum 4 metres in width.
- .3 Tensile Strength at 2% Strain (ASTM D6637): 8.5 kN/m (MARV)
- .4 Flexural Rigidity (ASTM D4355): 2,000,000 mg-cm
- .5 Non-Woven Geotextile with properties similar to those described in Section 2.1.1.

Based on general physical properties outlined above, equivalent composite geogrid/geotextile would be Titan TE-BXC30, or approved equal.

- .4 Uniaxial Geogrid (Owner Supplied) – TE-UX20PET:

- .1 Uni-axial geogrid for use as reinforcement tiebacks in the MSE backfill and/or the buttress shall consist of high-density polyethylene, polypropylene, or high density polyester geogrid mats which connect by gravity contact through the wall facing units and shall meet the following specifications at a minimum:

Property	Test Method	Unit	Minimum Average Roll Value (M.A.R.V.)
Tensile Strength at Ultimate	ASTM D6637	kN/m	50
Tensile Strength at 5% Strain	ASTM D6637	kN/m	22
Creep Reduced Strength	ASTM D5262	kN.m	34
Long Term Allowable Design Load	GRI GG-4(b)	kN/m	29

- .2 Supplied in rolls.

- .5 Uniaxial Geogrid (Buttress – lower rows):

- .1 Uni-axial geogrid for use as reinforcement tiebacks in the lower portion of the buttress shall consist of high-density polyethylene, polypropylene, or high-density polyester geogrid mats and shall meet the following specifications at a minimum:
-



Property	Test Method	Unit	Minimum Average Roll Value (M.A.R.V.)
Tensile Strength at Ultimate	ASTM D6637	kN/m	175
Tensile Strength at 5% Strain	ASTM D6637	kN/m	70
Long Term Allowable Design Load	GRI GG-4(b)	kN/m	65

.2 Supplied in rolls.

Based on general physical properties outlined above, equivalent uniaxial geogrid for use in the lower part of the buttress would be Titan TE-UX150PET, or approved equal.

.6 Erosion Control Blanket (ECB) (Owner Supplied) – C32BD:

.1 Composed of 100% coconut fibre matrix bound together with two layers of natural biodegradable netting.

.2 Supplied in rolls.

.3 Mass/Unit Area, minimum 300g/m<sup>2</sup>.

.4 Tensile strength to ASTM D6818, minimum MD of 3.4kN/m

.7 Pre-Staked Silt Fence Barrier:

.1 Composed of pre-strung filter fabric mounted on wooden stakes.

.2 Supplied in rolls.

.3 Property – Contractor grade 70 grams minimum.

.4 Weave 11 x 11.

.5 AOS 40 sieve.

.6 Flow Rate 24 gallons/minute/per foot.

.7 UV Resistance 80% after 500 hours.

2.2 Material Supplied .1  
by Owner

Owner supplied geotextile and geogrid shall be used prior to using Contractor supplied materials.

.2 The Owner has approximately **35** rolls (8ft x 112.5ft per roll) of C32BD biodegradable erosion control blanket (ECB) that shall be used prior to using Contractor supplied erosion control blanket.

.3 The erosion control blanket rolls are located at the Parks maintenance yard at the Tofino Airport, located within the Park. The access road to the airport is opposite the Long Beach parking lot on Highway 4.

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- .4 The Owner has approximately 50 rolls (8ft x 100ft per roll) of TE-UX20PET uniaxial geogrid that shall be used as indicated on the design drawings or other locations on the project as instructed by the Owner prior to using Contractor supplied uniaxial geogrid of equivalent strength.
- .3 The Owner has approximately 2000 cells of Envirogrid that shall be used as indicated on the design drawings and covered in Section 32 32 34 Retaining Walls.
- .4 The C32BD ECB, TE-UX20PET uniaxial geogrid, and Envirogrid will be provided without charge to the Contractor, who shall be responsible for loading and delivery from the storage area to the site. Material usage will be quantified and monitored by the DR.

2.3 Acceptable  
Alternatives:

- .1 Alternatives to various geotextiles can be presented to Parks and will be assessed on an individual request basis after award:

PART 3 -  
EXECUTION

3.1 Sequence of  
Operation

- .1 To minimize impacts to the existing subgrade the Work shall be performed in a manner to minimize the number of passages of heavy equipment over the subgrade in any given area.

3.2 Typical  
Installation of  
Geotextiles

- .1 Prepare ground surface by grading to provide a smooth, uniform surface. Remove all stumps, large rock, brush or other debris that could damage the fabrics and grids. Fill all holes and depressions so that the fabric does not bridge them. Replace loose or unstable soils.
  - .2 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with securing pins.
  - .3 Place geotextile material smooth in a loose fashion and free of tension stress, folds, wrinkles and creases.
  - .4 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile (ie. perpendicular to the strike of the slope).
  - .5 Overlap each successive strip of geotextile over previously laid strip. Fabric lap in accordance with manufacturer's recommendations with minimum of 300 mm for non-woven geotextile.
  - .6 Take care to prevent puncturing or tearing the geotextile. Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers. Repair all damage by use of patches that extend at least 1.0 m beyond the perimeter of the tear or puncture.
  - .7 After installation, cover with overlying layer within sufficient time so that ultraviolet damage does not occur. In no case shall this time exceed 7 days for ultraviolet susceptible material and 14 days for ultraviolet protected and low ultraviolet susceptible polymer geotextiles.
-

- .8 Replace damaged or deteriorated geotextile to approval of DR.
  - .9 Commence rip-rap placement at the base of the blanket area and proceed up the slope. Limit the height of drop of rip-rap to 0.5 m or less. Do not allow the rip-rap to roll down the slope.
- 3.3 Installation of Erosion Control Blankets
- .1 Prepare subgrade by grading to provide a smooth, uniform surface. Remove all stumps, large rock, brush or other debris that could damage the fabric. Fill all holes and depressions so that the fabric does not bridge them. Replace loose or unstable soils.
  - .2 Place erosion control blanket on all exposed surfaces as directed by OEM and Owner's geotechnical engineer.
  - .3 Roll the blankets vertically down the slope or in the direction of the of flow for channels in a loose fashion and free of tension stress, folds, wrinkles and creases.
  - .4 Overlap blankets a minimum 150mm in accordance with manufacturer's recommendations. No mid-slope joints (ie. full length top to bottom of slope).
  - .5 Secure the blanket at 600mm spacing vertically and 1.0 m horizontally on a staggered pattern with rebar hooked pins. Ensure that the blanket rests tightly against the slope and that water does not flow underneath. Pattern may differ for steeper slopes.
  - .6 Replace damaged or deteriorated blanket to approval of DR.
  - .7 Vehicles and equipment are not permitted directly on the erosion control blanket following installation. Contractor personnel shall avoid walking on or working from the erosion control blanket following installation.
- 3.4 Installation of Pre-Staked Silt Fence Barrier
- .1 For Pre-Staked Silt Fence Barrier, refer to Section 01 35 43 Environmental Procedures for installation requirements. Prepare fence alignment by removing all stumps, large rock, brush or other debris that could damage the fence. Fill all holes and depressions so that the fence does not bridge them.
  - .2 Dig a 150mm x 150mm anchor trench along the full length of the fence alignment.
  - .3 Install the fence along the full length of the alignment by driving the pre-installed wooden stakes sufficiently deep to ensure that 150 mm of the fence fabric is buried in the trench. Ensure that the silt fencing is pulled taught along the entire alignment to prevent sagging of the silt fence barrier.
  - .4 Backfill the trench to secure the buried fence fabric and tamp the soil.
- 3.5 Protection
- .1 Vehicles and equipment are not permitted directly on the geotextile or erosion control blanket following installation and Contractor personnel shall avoid walking on or working from the erosion control blanket following installation.
-

- 3.6 Maintenance
- .1 Items installed as a part of the Temporary Environmental Procedures shall be inspected by the Contractor on a weekly basis, during each significant rainfall event, or as directed by the OEM or DR and make repairs to the installations to bring them to a 'like new' condition.
  - .2 Items installed as a part of the Temporary Environmental Procedures that require regular cleaning shall be cleaned at intervals as directed by the OEM or DR.
  - .3 Items installed as Temporary Environmental Procedures shall be removed upon completion of the project or as directed by the OEM or DR. Obtain approval of OEM prior to removal.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement and Payment .1 The unit prices bid for this item shall be full compensation for all work necessary and incidental for excavation, geotextiles, and the supply, hauling and placing of riprap to the lines, grades and cross-sections indicated in the Drawings and as directed by the DR.
- .2 Measurement for payment for this item shall be by the square metre (length X width) for riprap placed to each specified thickness, based on the riprap class as measured and accepted by the DR.

**PART 2- PRODUCTS**

- 2.1 Stone .1 Hard, dense, durable quarry stone, angular in shape, resistant to weathering and water action, free from overburden, spoil, shale or shale seams, and organic material, care shall be taken to avoid introducing invasive plants into the Park Reserve by using clean materials. All stones having maximum dimension not greater than three times its least dimension, to meet following size distribution:

<b>Class of Riprap</b>	<b>Nominal Thickness of Riprap</b>	<b>Rock Gradation: Percentage Larger Than Given Rock Mass</b>		
<b>(kg)</b>	<b>(mm)</b>	<b>85%</b>	<b>50%</b>	<b>15%</b>
10	350	1 kg	10 kg	30 kg
25	450	2.5 kg	25 kg	75 kg
50	550	5 kg	50 kg	150 kg
100	700	10 kg	100 kg	300 kg
250	1000	25 kg	250 kg	750 kg
500	1200	50 kg	500 kg	1500 kg
1000	2500	100 kg	1000 kg	3000 kg

- .2 The minimum acceptable unit weight of the rock is 2.5 tonnes/cubic metre.
- 2.2 Geotextile Filter .1 Geotextile: in accordance with Section 31 32 19 – Geotextiles. Use a non-woven high survivability geotextile.

**PART 3 - EXECUTION**

- 3.1 Processing .1 Process riprap uniformly using methods that prevent contamination, segregation, and degradation.
- 3.2 Handling .1 Handle and transport riprap to avoid segregation, contamination, and degradation.
-

- 3.3 Placing
- .1 Where riprap is to be placed on slopes, excavate trench at toe of slope first, if and where instructed by the DR.
  - .2 Where riprap is to be placed, fine grade the area first to provide a uniform and even surface, if and where instructed by the DR. Fill any depressions with suitable materials and compact to provide a firm bed.
  - .3 Place geotextile on prepared surface in accordance with Section 31 32 19 – Geotextiles and as indicated. Avoid puncturing geotextile. Vehicle Traffic over geotextile is not permitted.
  - .4 Place rip-rap to thickness and detailed as indicated on the drawing.
  - .5 Place stones to secure the surface of the slope and create a stable mass.
  - .6 Place larger stones at the bottom of the slopes.
  - .7 Use larger stones for lower courses and as headers for subsequent courses.
  - .8 Stagger vertical joints and fill voids with rock spalls or cobbles.
  - .9 Finished surface to be reasonably uniform and even, free from bumps, depressions, underlying voids, large openings, or individual stones projecting out above apparent surface. Maximum deviation shall be ½ the diameter of the class or riprap used.
  - .10 Place riprap prior to permitting water to pass through slope drains, as applicable.
  - .11 Be careful not to damage the structure (new and existing components) in any way during riprap movement. Any damages shall be repaired at the expense of the Contractor.
  - .12 Embankments to be sloped to DR's requirements. Intent is that slopes be as gentle as possible within limitations of site geometry. Intent is that slopes to be reinforced with riprap to prevent future roadway embankment and river slope erosion, scour, migration, etc.

**END OF SECTION**

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**PART 1 - GENERAL**

- |                             |    |   |
|-----------------------------|----|---|
| 1.1 Introduction            | .1 | This section is for the control and elimination of invasive species that may be inadvertently introduced into the Park Reserve by the Contractors work or invasive species already existing within the Park Reserve.  |
| <br>                        |    |   |
| 1.2 Measurement and Payment | .1 | The lump sum price bid for this item shall be full compensation for all work necessary and incidental for the implementation of an invasive species control plan and eradication of all invasive species that are present within the limits of the trail construction work to the satisfaction of the DR and which were deemed by the DR or OEM not to be present prior to construction. The invasive species control shall begin as soon as the Contractor starts work in the Park Reserve and continue for a 24-month period after the Substantial Completion Certificate is issued. Invasive species control plan and eradication approaches to follow the mitigation measures and other requirements noted in the Environmental Procedures. |
|                             | .2 | Payment for this item shall be at the lump sum unit price tendered in the Schedule of Prices and Quantities. Release for payment shall be 50% payment release after the first year following Substantial Completion and 50% payment release at the completion of the invasive species control program.  |
|                             | .3 | The costs associated with bringing clean materials into the Park Reserve, such as special handling of granular materials and special procedures in gravel pits, shall be included in the prices submitted for those items.  |
|                             | .4 | The costs associated with cleaning equipment and personnel to avoid bringing invasive species into the Park Reserve or spreading invasive species that are already within the Park Reserve shall be included in the prices submitted for the items using the equipment and personnel.   |
|                             | .5 | If invasive species are identified that the DR or OEM determines, acting reasonably, were not brought into the Park Reserve by the Contractors work, the Contractor may be directed to remove these plants. The costs associated with this work will be paid by the Owner as an additional work item.   |
| <br>                        |    |   |
| 1.3 References              | .1 | Section 01 35 43 - Environmental Procedures.  |
| <br>                        |    |   |
| 1.4 Definitions             | .1 | Invasive plants: are any alien plant species that have the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems. Invasive plants have the capacity to establish quickly and easily on both disturbed and un-disturbed sites, and can cause widespread negative economic, social, and environmental impacts.  |
| <br>                        |    |   |
| 1.5 Related Sections        | .1 | Section 01 35 43 - Environmental Procedures.  |
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**PART 2 – PRODUCTS**

- 2.1 Invasive Species Control Plan .1 This document, the Invasive Species Control Plan, (ISCP) shall be produced by the Contractor to prevent invasive species entering the Park Reserve and to lay out the methods, frequency, and procedures for the control and removal of invasive species inadvertently brought into the Park Reserve by the Work. The ISCP shall be submitted to the DR for approval prior to commencement of the works on site.
- .2 The ISCP shall include the following preventative requirements:
- .1 Prior to starting work at a new location or site in the Park Reserve the Contractor shall advise the OEM 5 working days in advance on starting the new work site. The OEM will inspect the site for invasive species. If invasive species are found the OEM will develop a strategy to minimize or eliminate the spread of the invasive species. The Contractor will cooperate with the OEM to implement the recommended strategy. Additional payment will be made to the Contractor when the request is reasonable, made in advance of the work, and is accepted by the DR.
- .2 The Contractor shall follow the Best Management Practices for mitigating invasive species, appended to these specifications.
- .3 Sources of all materials shall be inspected by the Contractor and OEM and/or DR prior to supply of material to determine if invasive species are present and to formulate a protocol to avoid introducing these into the Park Reserve. This may include washing material prior to use, avoiding contaminated areas, constructing clean haul routes, and finding new, clean sources of materials.
- .4 Equipment (including haul trucks) and personnel shall be washed free of soil and dirt that may contain invasive species prior to entering the Park Reserve and when relocating within the Park Reserve.
- .3 Herbicides and other chemicals are not permitted within the Park Reserve boundary and will not be permitted for use in control and removal of invasive species of plants. All removals shall be manual removal (clipping, pulling by hand, digging roots, etc.)

**PART 3 - EXECUTION**

- 3.1 Examination .1 The Contractor must become familiar with the various invasive species and be able to identify them as soon as, or shortly after they appear so action can be taken immediately.
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|---------------------------------------|---|
| 3.2 Duration and Frequency of Removal | <ul style="list-style-type: none"><li>.1 The invasive species control shall begin as soon as the Contractor starts work in the Park Reserve and continue for a 24-month period after the Substantial Completion Certificate is issued.</li><li>.2 When the Contractor is physically working in the Park Reserve the removal of the invasive species shall occur within one week of the plants being identified or as agreed with the DR and OEM.</li><li>.3 When the Contractor is not actively working in the Park Reserve but the Certificate of Substantial Completion has not been issued, such as a winter shut down, the area of work shall be monitored at a frequency of twice per month and have any invasive species removed as they are identified.</li><li>.4 After the Certificate of Substantial Completion has been issued, the area of work shall be monitored at a frequency of twice per month between May 1 and September 30 (summer months) and once per month between October 1 and April 30 (winter months). Any invasive species shall be removed as they are identified during these inspections and a report shall be issued at the same frequency to the DR documenting such monitoring and removals.</li></ul> |
| 3.3 Methods for Removal               | <ul style="list-style-type: none"><li>.1 Herbicides and other chemicals are not permitted within the Park Reserve boundary and will not be permitted for use in control and removal of invasive species of plants.</li><li>.2 All removals shall be manual removal (clipping, pulling by hand, digging roots, etc.).</li><li>.3 Gasoline and diesel-powered vehicles will not be permitted on the trails. The personnel performing the inspections and removals will be permitted to use an electric vehicle such as a John Deere Gator model TE 4X2 (or approved equal) electric (maximum speed of 24 km/hr) to perform their duties. Vehicles will be required to meet WorkSafe BC standards for such vehicles. The vehicle shall be kept clean so that it does not spread invasive species during its operation.</li><li>.4 All plant materials collected shall be removed from the Park Reserve at the end of each day.</li></ul>   |
| 3.4 List of Invasive Species          | <ul style="list-style-type: none"><li>.1 PCA shall provide a list of invasive plant species that shall be removed. Additional invasive species may be added if they are discovered within the work site.</li></ul>  |
-

- 3.5 Cleaning
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Invasive species shall be place in plastic bags to contain potential seeds and contaminated soil, sealed for transport and disposed of outside the Park Reserve at an appropriate facility. Equipment, clothing and gear must be washed after handling invasive species. The approach to cleaning and removal of invasive species shall be included in the ISCP for approval by DR.
  - .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 11 - Cleaning.
  - .4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement and Payment .1 The unit price bid for saw cutting and removal of a 200 mm wide strip of highway edge shall be full compensation for all work necessary to saw cut the edge of asphalt concrete pavement full depth to create a smooth, clean surface to butt to for asphalt widening. The unit price bid shall include, but not be limited to: saw cutting the existing asphalt, cleaning the exposed edge, excavation, loading, hauling off-site, and disposal of the old asphalt and all other work and materials necessary to complete this portion of the Work to the satisfaction of the DR.
- .2 Measure for payment for removal of the 200 mm wide asphalt edge strip shall be measured along the cut line in the field and accepted by the DR.
- .3 The unit price bid for saw cutting and removal of two cuts across Highway 4 for installation of new 600mm culvert shall be full compensation for all work necessary to saw cut the edge of asphalt concrete pavement full depth to create a smooth, clean surface to butt to for replacement asphalt strip. The unit price bid shall include, but not be limited to: saw cutting the existing asphalt, cleaning the exposed edge, excavation, loading, hauling off-site, and disposal of the old asphalt and all other work and materials necessary to complete this portion of the Work to the satisfaction of the DR.
- .4 Measure for payment for removal of the highway asphalt for culvert installation shall be measured along the cut line in the field and accepted by the DR.
- 1.2 Related Sections .1 Section 01 25 20 - Mobilization and Demobilization.
- .2 Section 01 35 00 - Special Procedures for Traffic Control.
- .3 Section 01 35 43 - Environmental Procedures.
- .4 Section 01 56 00 - Temporary Barriers and Enclosures.
- .5 Section 01 74 11 - Cleaning.
- .6 Section 32 12 16 – Asphalt Paving.

**PART 2 -  
PRODUCTS**

- 2.1 Equipment .1 Use an asphalt saw capable of cutting through the full depth of the existing asphalt. The saw shall be self-propelled and maintain a constant cutting depth.
- .2 Equipment used to remove and load the asphalt being removed shall be capable of completing the work without damage the asphalt concrete being left in place.

**PART 3 –  
EXECUTION**

- 3.1 Preparation .1 Prior to beginning sawing operations, inspect and verify with DR areas, depths and lines of asphalt pavement to be removed.
- .2 Mark the section to provide a finished edge that is to within tolerances.
- .3 Protect existing pavement not designated for removal and structures from damage. In event of damage, immediately replace or make repairs to approval of
-

- DR at no additional cost.
- 3.2 Pavement Cutting and Removal .1 The existing asphalt concrete pavement shall be removed to the depth and width as specified on the drawings to provide a surface that is free of longitudinal and transverse irregularities.
- .2 Use equipment and methods of removal and hauling which do not damage or disturb underlying roadway structure.
- .3 The Contractor may substitute asphalt milling in place of cutting and loading out asphalt removed. Payment will be made at the same rate as asphalt removal.
- .4 The Contractor shall suppress dust generated and contain contaminated water produced by removal process.
- 3.3 Site Tolerances .1 The milled or cut edge shall have a uniform textured appearance, free from longitudinal and transverse irregularities and capable of allowing a smooth butt joint between the existing and new asphalt. The cut line shall be a minimum of 200 mm from cracked, broken off, or alligatored asphalt.
- .2 Finished edges in areas where asphalt pavement has been removed to be within +/-25 mm of alignment specified but not uniformly wide or narrow.
- 3.4 Sweeping .1 At all times, during the sawing operations, the traveled roadway shall be kept clean of all loose materials.
- .2 Sweep remaining asphalt pavement surfaces clean of debris resulting from the operations using rotary power brooms and hand brooming as required.
- 3.5 Disposal of Removed Asphalt Materials .1 The disposal of materials removed under this section shall be recycled outside the Park Reserve.
- .2 Where the Contractor elects to cold mill asphalt in place of saw cutting and removal, the cold millings shall be removed and disposed of outside the Park Reserve.

**END OF SECTION**

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**PART 1 - GENERAL**

- |     |                         |    |   |
|-----|-------------------------|----|---|
| 1.1 | Measurement and Payment | .1 | The unit prices bid for this item shall be full compensation for all work necessary and incidental for the supply, hauling, placing, and compaction of granular fill (75 mm Pit Run Gravel and Crushed Granular Subbase) to the cross sections, dimensions and grades indicated on Drawings and as directed by the DR.  |
|     |                         | .2 | The unit prices bid for each of these items shall include, but not be limited to: ensuring the material supplied and equipment delivering the materials to site are free of invasive species plant materials, supply and application of water as required to meet the specified density, and all other work and materials necessary to complete this portion of the Work to the satisfaction of the DR. |
|     |                         | .3 | Measure for payment for these items shall be per cubic metre of granular material supplied and incorporated into the Works. Measurement is made as length X width X depth or survey cross sections measured in place and as accepted by DR.   |
| 1.2 | References              | .1 | ASTM C117, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.   |
|     |                         | .2 | ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.   |
|     |                         | .3 | ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.   |
|     |                         | .4 | ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2,700 kN-m/m <sup>3</sup> )).   |
|     |                         | .5 | ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.   |
|     |                         | .6 | ASTM D4718, Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.  |
|     |                         | .7 | CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.   |
|     |                         | .8 | CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.  |

**PART 2 – PRODUCTS**

- |     |           |    |   |
|-----|-----------|----|---|
| 2.1 | Materials | .1 | 75 mm Pit Run Gravel: to Section 31 05 16 – Aggregates            |
|     |           | .2 | 75 mm Crushed Granular Sub-Base: to Section 31 05 16 – Aggregates |

**PART 3 –  
EXECUTION**

- |     |                                 |    |  |
|-----|---------------------------------|----|--|
| 3.1 | Inspection of Sub-grade Surface | .1 | Place granular fill after underlying surface is inspected, accepted by DR. Cover sub grade with approved geotextile. |
|-----|---------------------------------|----|--|
-

- 3.2 Placing
- .1 Stockpile granular fill off site as specified under Section 31 05 16 – Aggregates.
  - .2 Place granular fill to depths and grades indicated.
  - .3 To minimize impacts to the existing vegetation the Work shall be performed in a manner to minimize the number of passages of heavy equipment over the sub-grade in any given area. Trucks bringing granular fill into the trail shall be used to back haul excess soil from the site. The subgrade shall not be tracked by machines and shall not be left exposed overnight.

For the trails into the slope area, the Work shall proceed sequentially along the trail: clearing (mostly complete), grubbing (short section), then topsoil stripping and side casting or removal as required by the contract documents, mineral soil excavation to subgrade over a short section immediately followed by placing geotextile and sub-grade fill as required. The definition of short will be weather and moisture dependent but in general, the intent is that the excavator would not track over the subgrade until it is suitably protected with a layer of granular fill..

For the slope area, a similar approach is to be taken and the contractor is to follow the approved construction sequencing and methodology plan. In general, exposure of a large area that cannot be suitably protected by end of work day is to be avoided.
  - .4 If locally required, when placing the first lift of granular material on soft, natural sub-grade the material shall be lightly rolled and without vibration. The density of this first layer shall not be required to obtain specified densities if agreed to by the DR.
  - .5 Begin spreading Granular fill material on the crown line or on the high side of one-way slope.
  - .6 Place material using methods which do not lead to segregation or degradation of aggregate.
  - .7 Place material in uniform layers not exceeding 300 mm compacted thickness. DR may authorize thicker layers if specified compaction can be achieved or if, in areas of soft soils, additional thickness is required to support equipment. In area where this procedure is applied, Subsequent lifts should be no greater than 200 mm thick.
  - .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
  - .9 Remove and replace segregated material.
  - .10 When placing granular fill around retained roots, roots shall be protected with fabric and the material shall be lightly rolled without vibration. The density of this first layer shall not be required to obtain specified densities if agreed to by the DR.
-

- |                      |    |   |
|----------------------|----|---|
| 3.3 Compacting       | .1 | Compact to minimum 95% maximum dry density, to ASTM D1557 and ASTM D4718 or as noted in clause 3.2.4 and 3.2.10, above.   |
|                      | .2 | Shape and roll alternately to obtain smooth, even and uniformly compacted structure. Compaction may be modified as described in clause 3.2.4 and 3.2.10, above.   |
|                      | .3 | Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.  |
|                      | .4 | When placing granular sub-base around retained roots, roots shall be protected with fabric and the material shall be lightly rolled without vibration. The first layer shall not be required to obtain specified densities if agreed to by the DR |
|                      | .5 | Compaction equipment is to be capable of obtaining required material densities. For the most part this is anticipated to be a minimum 1000 lb plate compactor, and preferably a roller compactor.   |
| 3.4 Finish Tolerance | .1 | Finished compacted surface to be plus / minus 15 mm of established grade and cross section.   |
|                      | .2 | Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.  |
| 3.5 Maintenance      | .1 | Maintain finished granular fill in condition conforming to this Section until acceptance by DR and succeeding material is applied.  |
|                      | .2 | Apply dust control measures as required.  |
|                      | .3 | Ensure that granular fill surface is in properly compacted state prior to application of succeeding material.   |

**END OF SECTION**

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**PART 1 - GENERAL**

- |                             |  |
|-----------------------------|--|
| 1.1 Measurement and Payment | <p>.1 The unit prices bid for this item shall be full compensation for all work necessary and incidental for the supply, hauling, placing, and compaction of various thicknesses of granular base to the cross sections, dimensions and grades indicated on Drawings and as directed by the DR.</p> <p>.2 The unit price bid for this item shall include, but not be limited to: ensuring the material supplied and equipment delivering the materials to site are free of invasive species plant materials, supply and application of water as required to meet the specified density, restoring the base surface to specified condition just prior to paving if required, and all other work and materials necessary to complete this portion of the Work to the satisfaction of the DR.</p> <p>.3 Measure for payment for this item shall be per square metre of completed granular base course, length X finished surface design width as shown on the Drawings. Measurements shall be taken on the finished surface of the granular base. Where the actual measured width on the finished surface differs from the design width, the actual width may be used for payment at the discretion of the DR. Where the actual measured thickness of the finished base course differs by more than 10 mm from the design thickness the payment may be pro-rated at the discretion of the DR.</p> <p>.4 Measure for payment for granular base shoulder dressing shall be per linear metre of completed shoulder roadway measured along the shoulder dressing using granular base course, length X finished surface design width as shown on the Drawings and accepted by the DR.</p> <p>.5 If the granular material being brought to site is weighed by an approved scale the volumes of granular base may be, if approved by the DR, calculated using weight tickets (submitted daily) divided by the compacted density.</p> |
| 1.2 References              | <p>.1 ASTM C117, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.</p> <p>.2 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.</p> <p>.3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.</p> <p>.4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).</p> <p>.5 ASTM D4718, Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.</p> <p>.6 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).</p> <p>.7 ASTM D1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.</p> <p>.8 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and</p>  |
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Plasticity Index of Soils.

- .9 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- .10 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

PART 2 -  
PRODUCTS

- 2.1 Materials .1 Granular base: material to Section 31 05 16 – Aggregates.

PART 3 –  
EXECUTION

- 3.1 Sequence of Operation .1 Stockpile Granular Base off site as specified under Section 31 05 16 – Aggregates.
- .2 Place Granular Base after underlying surface is to within tolerances.
- .3 Placing:
- .1 Construct Granular Base to depth and grade in areas indicated.
  - .2 Ensure no frozen material is placed.
  - .3 Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.
  - .4 Begin spreading base material on crown or on high side of slope.
  - .5 Place material using methods which do not lead to segregation or degradation of aggregate.
  - .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
  - .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
  - .8 Remove and replace that portion of layer in which material becomes segregated during spreading.
  - .9 For granular base shoulder dressing place granular base to the width shown on the drawings flush to the asphalt surface and sloped to match the base surface at the prescribed distance. Compact shoulder material and sweep asphalt to leave a clean surface.
- .4 Compaction Equipment:
- .1 Compaction equipment to be capable of obtaining required densities. Generally this is anticipated to be a minimum 1000 lb plate compactor.
- .5 Compacting:
- .1 Compact to density not less than 95% maximum dry density in accordance with ASTM D1557 (Modified Proctor). At the discretion of the DR proof rolling of the compacted sub-base using fully loaded haul trucks may be substituted for a portion of the required density tests.
-

- .2 Shape and roll alternately to obtain smooth, even, and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 Dry gravel if Granular Base is excessively moist.
  - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.
  - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.2 Site Tolerances
- .1 Finished Trail base surface to be within plus or minus 0.5% of established cross section slope with positive drainage.
  - .2 Finished Trail surface not to have irregularities exceeding 10 mm when checked with 3 m straight edge placed in any direction.
  - .3 Finished Highway base surface to be within plus or minus 10 mm of established grade and cross section slope with positive drainage.
  - .4 All finished Granular Base surfaces are subject to acceptance by DR.
- 3.3 Maintenance
- .1 Maintain finished Granular Base in condition conforming to this section until succeeding material is applied or return Granular Base to condition acceptable to DR prior to paving or project completion.
  - .2 Apply dust control measures as required.
  - .3 Ensure that Granular Base surface is in properly compacted state prior to application of succeeding material.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Introduction .1 Access from Highway 4 to the trail during construction is provided by two existing temporary gravel access points. These were left in place by the previous Contractor to provide construction access. It is the responsibility of the Contractor to maintain these temporary access points during construction and to remove them and restore the ground to a natural condition upon completion of the project. A third smaller access was constructed to provide drill rig access during geotechnical investigations which may need to be upgraded for main construction usage.
- 1.2 Measurement and Payment .1 The unit prices bid for this item shall be full compensation for all work necessary and incidental to maintain, and upon completion of the work, to remove them and return the areas to natural condition as indicated on Drawings and directed by the DR.
- .2 The costs associated with maintaining the temporary access points during construction shall be considered incidental to the project and not paid for separately.
- .3 The lump sum price bid for the maintenance and removal of all Temporary Access Points shall include, but not be limited to, excavation and disposal off site of the previously imported granular materials (approximately 450 mm thick and 4 m wide plus ditch infill of various thicknesses), removal and off-site disposal of culverts, removal and off-site disposal of geotextiles and returning the area to a natural condition to the satisfaction of the DR through the addition of top soil and some large woody debris such as logs and stumps to be spread over temp access as part of their reclamation..

**PART 2 -  
PRODUCTS**

- 2.1 Materials Not Used.

**PART 3 –  
EXECUTION**

- 3.1 Maintenance .1 Maintain finished Granular Base in condition that permits construction traffic to exit the site without tracking debris or dirt onto the road including watering and watering.
- .2 Apply dust control measures as required.
- .3 Ensure the access road provides safe conditions for vehicle use.
- .4 Install suitable method to close the access road, including, but is not limited to signage, fences and gates, to prevent the public from using the access point when it is not required for construction, including at night, and on weekends. Install suitable bi-lingual signage noting for use by construction traffic only.
- .5 Provide suitable signage and fences at access or other points along the highway to prevent access to the trail from any other locations other than access points approved by the DR and to prevent unapproved trails forming through the park.
-

- 3.2 Removal and Cleaning
- .1 After construction is complete, all temporary access points shall be removed by the Contractor. Permanent access points shall be left with a well graded and compacted surface and cleaned to the same standard as the main trail.
  - .2 The Contractor shall completely remove access points and complete the environmental restoration to the satisfaction of the DR and the OEM in accordance with Section 31 14 13 - Trail Work, Soil Stripping, Stockpiling and Respreading and other applicable sections
    - .1 Refer to Section 01 74 11 - Cleaning, for any additional requirements to return the area to acceptable condition to the satisfaction of the DR. This will include but not be limited to organics and woody debris as directed by OEM.
    - .2 Place additional organic material over all disturbed areas of the temporary access, 100mm thick, or as directed by the OEM
  - .3 At the temporary access points remove granular base and sub base materials and ditch infill material.
  - .4 At the temporary access points remove geotextile material gathering it up to capture the imported granular materials and leaving the original organic surface intact.
  - .5 At the temporary access points remove culvert and restore the drainage ditch to original cross section and.
  - .6 The area shall be covered with erosion control blankets (separate payment) if erosion is a concern.
  - .7 Remove those sediment control devices and materials that are no longer needed and install any devices that are needed, as directed by the DR.
  - .8 Return the gravel shoulder of the road or highway to original condition and repair any damage to the asphalt.
  - .9 All materials removed shall be disposed of outside the Park Reserve boundaries.

**END OF SECTION**

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**PART 1 - GENERAL**

- |                             |    |   |
|-----------------------------|----|---|
| 1.1 Measurement and Payment | .1 | The unit prices bid for this item shall be full compensation for all work necessary and incidental for the supply, hauling, placing, rolling and compaction of hot mix asphaltic concrete pavement to the lines, grades and cross-sections indicated for designated areas as indicated in the Drawings and as directed by the DR.   |
|                             | .2 | The prices bid shall include, but not be limited to: provision of mix designs; joint preparation; adjusting and cleaning of castings. if any; supply, placing, rolling and compaction of the specified compacted thickness hot mix asphaltic concrete; testing; and all other work and materials incidental and necessary to complete this Work to the satisfaction of the DR.  |
|                             | .3 | Measurement for payment for this item shall be per neat square metre of compacted asphaltic concrete of type indicated, placed (measured center line length X design width) to the specified thickness and accepted by the DR.  |
|                             | .4 | For Asphalt Pavement Items in the Unit Price Table an asphalt mix design meeting the "Surface Course" gradation in clause 2.1.3 and the "Surface Course" properties in clause 2.3.3 shall be acceptable. This will permit the Contractor to use the same asphalt mix for all paving requirements in this contract.  |
|                             | .5 | Payment for steel road-box (bold-down, flush-mount manhole) shall be per installed unit, payable upon successful installation as confirmed by Parks and Geotechnical Engineer. Cost shall be all inclusive for supply, delivery and installation to protect the existing Slope Inclinator casing. Shall include asphalt cutting (if needed), concrete infill below and around the exterior of the road-box plus an asphalt cap. |
| 1.2 Mix Design              | .1 | Mix Design: Submit asphalt concrete mix design and trial mix test results to DR for review at least 4 weeks prior to beginning Work.  |
| 1.3 References              | .1 | Asphalt Institute (AI)  |
|                             | .1 | AI MS-2, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.   |
|                             | .2 | ASTM International  |
|                             | .1 | ASTM C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.   |
|                             | .2 | ASTM C117, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.  |
|                             | .3 | ASTM C123, Standard Test Method for Lightweight Particles in Aggregate.   |
|                             | .4 | ASTM C127, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.  |
|                             | .5 | ASTM C128, Standard Test Method for Density, Relative Density   |
-

(Specific Gravity), and Absorption of Fine Aggregate.

- .6 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .7 ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- .8 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.
- .9 ASTM D995, Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .10 ASTM D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .11 ASTM D3203, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .12 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.4 Action and  
Informational  
Submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Upon request of DR, 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.
- .3 Mix Design: Submit asphalt concrete mix design and trial mix test results to DR for review at least 4 weeks prior to beginning Work.

1.5 Delivery, Storage  
and Handling

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Product Requirements.

PART 2 -  
PRODUCTS

2.1 Material

- .1 Performance graded asphalt cement: to PG-64-22.
- .2 Reclaimed Asphalt Pavement (RAP):
  - .1 Crushed and screened to ensure 100% of RAP material passes 37.5 mm screen before mixing.
- .3 Aggregates: in accordance with Section 31 05 16 - Aggregate and requirements as follows:

- .1 Crushed stone or gravel.
- .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117.
- .3 Gradations to conform to the below table:

Sieve Designation	% Passing
	<b>Surface Course</b>
12.5 mm	100
9.5 mm	-
4.75 mm	55-75
2.36 mm	38-58
1.18 mm	28-47
0.600 mm	20-36
0.300 mm	10-26
0.150 mm	4-17
0.075 mm	3-8

- .4 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.
  - .5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.
  - .6 Do not use aggregates having known polishing characteristics in mixes for surface courses.
  - .7 Sand equivalent: ASTM D2419. Min: 40.
  - .8 Magnesium Sulphate soundness: to ASTM C88. Max% loss by mass:
    - .1 Coarse aggregate: 15%.
    - .2 Fine aggregate: 18%.
  - .9 Los Angeles degradation: Grading B, to ASTM C131. Max% loss by mass:
    - .1 Coarse aggregate, surface course: 25%.
  - .10 Absorption: to ASTM C127. Max% by mass:
    - .1 Coarse aggregate, surface course: 1.75%.
  - .11 Loss by washing: to ASTM C117. Max% passing 0.075 mm sieve:
    - .1 Coarse aggregate, surface course: 1.5%.
-

- .12 Lightweight particles: to ASTM C123. Max% by mass less than 1.95 relative density:
  - .1 Surface course: 1.5%.
- .13 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5): Max% by mass:
  - .1 Coarse aggregate, surface course: 10%.
- .14 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 2 freshly fractured faces. Material to be divided into ranges, using methods of ASTM C136.

Passing		Retained on
25 mm	to	12.5 mm
12.5 mm	to	4.75mm

- .15 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.
- .4 Mineral filler:
  - .1 Ensure finely ground particles of limestone, hydrated lime, Portland cement or non-plastic mineral matter approved by DR are thoroughly dry and free from lumps.
  - .2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by DR to improve mix properties.
  - .3 Ensure mineral filler is dry and free flowing when added to aggregate.
- .5 Protective Galvanized Steel Road-Box (Bolt-Down, Flushmount Manhole)
  - .1 Minimum 200 mm diameter with minimum 200 mm long skirt
  - .2 Water resistant, 2 bolt lid, with minimum 150 mm ID opening and 200 mm OD flange;
  - .3 Secure base of the road-box and lower 50 to 100 mm in non-shrink grout/concrete. Do not fill inside monitoring casing. Geotechnical Engineer to be notified and provide approval prior to any cutting of the monitoring casing;
  - .4 Backfill exterior perimeter of road-box with concrete;
  - .5 Surface layer of minimum 75 mm thick asphalt patch placed and compacted with Marshall hammer or approved equivalent tool in a minimum two lifts;
  - .6 Road-box shall be adjusted to sit flush with new pavement.

- 2.2 Equipment .1 Pavers: mechanical [grade controlled] self-powered pavers capable of spreading mix
-



within specified tolerances, true to line, grade and crown indicated.

- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
  - .1 Drum diameter: 1200 mm minimum.
  - .2 Amplitude of vibration (machine setting): 0.5 mm maximum for lifts less than 40 mm thick.
- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
  - .1 Boxes with tight metal bottoms.
  - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
  - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
  - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Hand tools:
  - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
  - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm<sup>2</sup> for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by DR, may be used instead of tamping irons.
  - .3 Straight edges, 4.5 m in length, to test finished surface.

- 2.3 Mix Design
- .1 Mix design to be approved in writing by DR.
  - .2 Mix may contain maximum 20% by mass of RAP. D R may approve higher proportion of RAP if Contractor demonstrates ability to produce mix meeting requirements of specification.
  - .3 Design of mix: by Marshall method to requirements below:
    - .1 Compaction blows on each face of test specimens: 75.
    - .2 Mix physical requirements:

Property	Pavement Course
Marshall Stability at 60 degrees C kN min	5.5 surface course
Flow Value mm	2-4
Air Voids in Mixture, %	3-5 surface course
Voids in Mineral Aggregate, % min	15 surface course
Index of Retained Stability % minimum	75

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- .3 Measure physical requirements as follows:
  - .1 Marshall load and flow value: to ASTM D1559.
  - .2 Air voids: to ASTM D3203.
  - .3 Index of Retained Stability: measure in accordance with Marshall Immersion Test ASTM D1559.
- .4 Do not change job-mix without prior approval DR. When change in material source proposed, new job-mix formula will be provided and approved by DR.

### PART 3 - EXECUTION

#### 3.1 Plant and Mixing Requirements

- .1 Batch and continuous mixing plants:
  - .1 To ASTM D995.
  - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.
    - .1 Do not load frozen materials into bins.
  - .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
  - .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
  - .5 Before mixing, dry aggregates to moisture content not greater than 0.5% by mass or to lesser moisture content if required to meet mix design requirements.
  - .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
  - .7 Store hot screened aggregates in manner to minimize segregation and temperature loss.
  - .8 Maintain temperature of materials within 5° C of specified mix temperature during mixing.
  - .9 Mixing time:
    - .1 In batch plants, dry mix for hot less than 10s. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.
    - .2 In continuous mixing plants, mixing time as required but not less than 45s.
  - .10 Where RAP is to be incorporated into mix:
    - .1 Feed from separate cold feed bin specially designed to minimize consolidation of material.
      - .1 Provide 37.5 mm scalping screen on cold feed to remove oversized pieces of RAP.

- .2      Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti-rollback device to prevent material from sliding backward on feed belt.
  - .3      Combine RAP and new aggregates in proportions as specified. Dry mix thoroughly, until uniform temperature within plus or minus 5° C of mix temperature is achieved prior to adding new asphalt cement. Do not add new asphalt cement where temperature of dried mix material is above 160° C.
  - .2      Dryer drum mixing plant:
    - .1      To ASTM D995.
    - .2      Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
    - .3      Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.
    - .4      Where RAP is to be incorporated into mix, dryer drum mixer is to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180° C.
    - .5      Feed RAP from separate cold feed bin designed to minimize reconsolidation of material.
    - .6      Meter total flow of aggregate and RAP using electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump to ensure proportions of aggregate, RAP and asphalt entering mixer remain constant.
    - .7      Allow for easy calibration of weighing systems for aggregates and RAP without having material enter mixer.
    - .8      Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
      - .1      Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time.
      - .2      Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.
    - .9      Make provision for conveniently sampling full flow of materials from cold feed.
    - .10     Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.
    - .11     Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
    - .12     Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame
-

and exhaust gas stream.

- .1 Control heating to prevent fracture of aggregate or excessive oxidation of asphalt.
- .2 Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator.
- .13 Ensure mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer is 0.5% maximum.
- .3 Temporary storage of hot mix:
  - .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
  - .2 Do not store asphalt mix in storage bins in excess of 12 hour.
- .4 Mixing tolerances:
  - .1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve and larger	5.5
2.36 mm sieve	4.5
0.600 mm sieve	3.5
0.150 mm sieve	2.5
0.075 mm sieve	1.5

- .2 Permissible variation of asphalt cement from job mix: 0.25%.
- .3 Permissible variation of mix temperature at discharge from plant: 5° C.

- 3.2 Preparation
  - .1 Reshape granular trail bed.
  - .2 When paving over existing asphalt surface, clean pavement surface. When levelling course is not required, patch and correct depressions and other irregularities to approval of DR before beginning paving operations.
  - .3 Apply tack coat in accordance with Section 32 12 13.16 prior to overlay paving.
  - .4 Prior to laying mix, clean surfaces of loose and foreign material.
- 3.3 Transportation of Mix
  - .1 Transport mix to job site in vehicles cleaned of foreign material.
  - .2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum

based commercial product, at least daily or as required.

- .1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.
- .3 Schedule delivery of material for placing in daylight, unless DR approves artificial light for night placing.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.
  - .1 Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within specified range, but not less than 125° C.

### 3.4 Placing

- .1 Obtain DR's approval of base, existing surface prior to placing asphalt.
  - .2 Place asphalt concrete to thicknesses, grades and lines as indicated.
  - .3 Placing conditions:
    - .1 Place asphalt mixtures only when air temperature is 5° C minimum.
    - .2 When temperature of surface on which material is to be placed falls below 10° C, provide extra rollers as necessary to obtain required compaction before cooling.
    - .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
  - .4 Place asphalt concrete in compacted lifts of thickness as indicated.
  - .5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.
  - .6 Spread and strike off mixture with self-propelled mechanical finisher.
    - .1 Construct longitudinal joints and edges true to line markings. Position and operate paver to follow established line closely.
    - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case, more than 3 m apart.
    - .3 Maintain constant head of mix in auger chamber of paver during placing.
    - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
    - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
    - .6 Correct irregularities in surface of pavement course directly behind paver.
    - .7 Do not throw surplus material on freshly screeded surfaces.
-

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

- 3.5 Compacting
    - .1 Roll asphalt continuously using established rolling pattern for test strip and to density of not less than 97% of 75 blow Marshall density in accordance with ASTM D1559 with no individual test less than 95%.
    - .2 General:
      - .1 Provide at least 2 rollers and as many additional rollers as necessary to achieve specified pavement density. When more than 2 rollers are required, 1 roller must be pneumatic tired type.
      - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
      - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
      - .4 Use static compaction for levelling coarse less than 25 mm thick.
      - .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
      - .6 Overlap successive passes of roller by at least one-half width of roller mm and vary pass lengths.
      - .7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
      - .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
      - .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
-

- .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.
    - .1 Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
  - .11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
  - .12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
  - .3 Breakdown rolling:
    - .1 Begin breakdown rolling immediately following rolling of transverse and longitudinal joint and edges.
    - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
    - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by DR.
    - .4 Use only experienced roller operators.
  - .4 Intermediate rolling:
    - .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
    - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
  - .5 Finish rolling:
    - .1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks.
      - .1 If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by DR.
    - .2 Conduct rolling operations in close sequence.
- 3.6 Joints
- .1 General:
    - .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
    - .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
    - .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
  - .2 Transverse joints:
    - .1 Offset transverse joint in succeeding lifts by at least 600mm.
-

- .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
    - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
  - .3 Longitudinal joints:
    - .1 Offset longitudinal joints in succeeding lifts by at least 150mm.
    - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100° C prior to paving of adjacent lane.
      - .1 If cold joint cannot be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
    - .3 Overlap previously laid strip with spreader by 100 mm.
    - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
    - .5 Roll longitudinal joints directly behind paving operation.
    - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150mm extending onto previously placed and compacted lane.
  - .4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix.
    - .1 Place and compact joint to smooth finish without visible breaks in grade.
    - .2 Locate feather joints as indicated.
  - .5 Construct butt joints as indicated.
- 3.7 Finish Intolerances
  - .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.
- 3.8 Defective Work
  - .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
  - .2 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.
  - .3 Finished surface must be the color of asphalt (patch work should be finished so that it is the same colour of the rest of the trail surface)
- 3.9 Cleaning
  - .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.



**PART 1 - GENERAL**

- |                             |    |  |
|-----------------------------|----|--|
| 1.1 Measurement and Payment | .1 | No separate payment will be made for ongoing dust control. Include ongoing water dust control in all Work as part of the relevant unit prices of the contract. |
|                             | .2 | Supply and apply water as part of dust control only if directed to do so by the DR.  |

**PART 2 - PRODUCTS**

- |               |    |  |
|---------------|----|--|
| 2.1 Materials | .1 | Water shall be supplied by the Parks without charge.   |
|               | .2 | The Contractor shall apply for hydrant use permission to the Park administration and shall supply, install, and remove a suitable valve and connection system to the hydrant being used. |

**PART 3 -  
EXECUTION**

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|-----------------|----|--|
| 3.1 Application | .1 | Control dust at all times for the duration of the Contract or as directed by DR.                                   |
|                 | .2 | Apply water with distributors equipped with means of shutoff and with spray systems to ensure uniform application. |

**END OF SECTION**

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**PART 1 - GENERAL**

- |   |    |   |
|---|----|---|
| 1.1 Measurement and Payment             | .1 | The unit prices bid for this item shall be full compensation for all work necessary and incidental for the supplying and placing pavement markings as indicated in the Drawings and as directed by the DR.                      |
|   | .2 | Measurement for payment for multi-use trail centerline pavement markings shall be at the per linear metre price tendered in the Unit Price Table. Measurement will be made in the field along the completed painted centerline. |
| 1.2 References                          | .1 | Canadian General Standards Board (CGSB)   |
|   | .1 | CAN/CGSB-1.5, Low Flash Petroleum Spirits Thinner.  |
|   | .2 | CAN/CGSB 1.74, Alkyd Traffic Paint.   |
|   | .2 | Health Canada / Workplace Hazardous Materials Information System (WHMIS)  |
|   | .1 | Material Safety Data Sheets (MSDS).   |
| 1.3 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 two copies of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements.   |
|   | .3 | Samples:  |
|   | .1 | Submit to Departmental Representative following material sample quantities at least 4 weeks prior to commencing work.   |
|   | .1 | Two 1 L samples of each type of paint.  |
|   | .2 | One 1 kg sample of glass beads.   |
|   | .3 | Sampling to CGSB 1-GP   |
|   | .2 | Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, CGSB specification number, formulation number and batch number.   |
| 1.4 Delivery, Storage and Handling      | .1 | Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Product Requirements.   |
|   | .2 | Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.   |
-

**PART 2 - PRODUCTS**

- 2.1 Materials .1 Paint:
- .1 To CSGB 1-GP-74M, alkyd traffic marking.
  - .2 To CSGB 1-GP-149M, alkyd reflectorized traffic marking.
  - .3 Colour: to CSGB 1-GP-12C, yellow 505-308, black 512-301 and white 513-301.
- .2 Thinner: to CSGB 1-GP-5M.
- .3 Glass reflective beads: Overlay type to CSGB 1-GP-74M, suitable for application to wet paint surface for light reflectance.
- .4 Temporary pavement marking tape:
- .1 Material composition shall be at the discretion of the manufacturer subject to the approval of the DR. Each formulation shall be identified by a code number.
  - .2 The colour of the marking to be brilliant white or yellow at the discretion of the DR. The brightness value shall exceed 70% for the white and 45% for yellow obtained with a Gardner Multi-purpose Reflectometer when measuring 0 - 45 degrees C daylight luminous directional reflectance with the green filter.

**PART 3 -  
EXECUTION**

- 3.1 Examination .1 Pavement surface to be dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- 3.2 Equipment Requirements .1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.
- .2 Distributor: capable of applying reflective glass beads as overlay on freshly applied paint.
- 3.3 Application .1 Lay out pavement markings.
- .2 Unless otherwise approved by DR, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast.
- .3 Apply traffic paint evenly at rate of 3 m<sup>2</sup>/L.
- .4 Do not thin paint unless approved by DR.
- .5 Symbols and letters to dimensions indicated.
- .6 Paint lines: of uniform colour and density with sharp edges.
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|----------------------------------|----|---|
|                                  | .7 | Thoroughly clean distributor tank before refilling with paint of different colour.            |
|                                  | .8 | Apply glass beads at rate of 0.5 kg/l of painted area immediately after application of paint. |
|                                  | .9 | Remove temporary markings immediately after installing permanent pavement markings.           |
| 3.4 Tolerance                    | .1 | Paint markings: within plus or minus 12 mm of dimensions indicated.                           |
| 3.5 Protection of Completed Work | .1 | Protect pavement markings until dry.  |

**END OF SECTION**

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**PART 1 - GENERAL**

- |                                    |    |  |
|------------------------------------|----|--|
| 1.1 Measurement for Payment        | .1 | The unit prices bid for these items shall be full compensation for all work necessary and incidental for the supply and installation of all traffic signage; relocation of signage, including posts, bases (where required) and hardware as indicated in the Drawings and as directed by the DR. |
|                                    | .2 | Measurement for payment for this item shall be at by count for each type of sign specified in the Unit Price Table.  |
| 1.2 References                     | .1 | ASTM International   |
|                                    | .1 | ASTM B221M, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.   |
|                                    | .2 | ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.   |
|                                    | .3 | ASTM D4956, Standard Specification for Retro-reflective Sheeting for Traffic Control.  |
|                                    | .2 | CSA Canadian Standards Association   |
|                                    | .1 | CSA 0121M-1978, Douglas Fir Plywood.   |
|                                    | .3 | Sign Pattern Manual, British Columbia.   |
|                                    | .4 | Specifications for Standard Highway Sign Materials, Fabrication and Supply – BC Ministry of Transportation and Infrastructure, latest edition.   |
|                                    | .5 | 2012 Standard Specifications for Highway Construction – BC Ministry of Transportation and Infrastructure, latest edition.  |
| 1.3 Delivery, Storage and Handling | .1 | Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Product Requirements.  |
|                                    | .2 | Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.  |

**PART 2 - PRODUCTS**

- |               |    |  |
|---------------|----|--|
| 2.1 Materials | .1 | Signs  |
|               | .1 | Aluminum sheet sign blank conforming to the requirements of ASTM B 209, Aluminum Alloys 6061-T-6 or 5052-H38.  |
|               | .2 | Sign face to be silk screened with face to be retro-reflective diamond grade (or equal) to show the same color, shape and message at night as they appear in daytime.                                  |
|               | .3 | Message to be in accordance with Uniform Traffic Control Manual of Canada, latest edition. Worded messages to be bilingual with English on the left side and French, of equal size, on the right side. |
|               | .4 | Dimensions of signs are as shown in the MUTCDC.  |
|               | .5 | Selected signage will have translations to the First Nations language of the area. Translations will be provided by Parks Canada.  |
-

- .6 Conform to the Specifications for Standard Highway Sign Materials, Fabrication and Supply – BC Ministry of Transportation and Infrastructure, latest edition.
- .2 Posts
  - .1 Sign posts shall be perforated square galvanized steel posts to BC Ministry of Transportation and Infrastructure Specification Section 635.28 or perforated U channel galvanized steel posts. U-channel posts shall be perforated, galvanized, and weigh 3kg/metre (2 lb/foot).
  - .2 Where signs are mounted on concrete barriers sign posts shall be round galvanized steel pipe 2 3/8" (60.325mm) Schedule 40, conforming to ASTM A-53, grade B and mounted as shown on BC Ministry of Transportation and Infrastructure Specification Drawing SP635-3.8.3.
  - .3 Posts shall be hot dipped galvanized conforming to ASTM A653 G-90 or CSA G164.
  - .4 Field cut pipe ends shall be coated with cold galvanizing compound.
- .3 All hardware, nuts, bolts, washers, to be stainless steel.
- .4 Project Signs shall be supplied, installed, maintained, and removed by the Contractor under this item. Sign supports may be 100mm X 100mm X3m long wood posts with 89mm X 38mm wood support frames. Sign face is 1200mm X 2400 mm and may be corrugated plastic sheet (Coroplast, Hi-Core, or equal) or weatherproof plywood. Paint shall be all weather paint to Ministry of Transportation sign standards.

### PART 3 - EXECUTION

- 3.1 Installation
  - .1 Steel pipe posts to be supplied in continuous lengths, with no splices, and shall be field cut to suit each particular installation. All field cuts to be painted with cold galvanizing compound.
  - .2 Posts to be installed plumb.
  - .3 For signs on concrete barriers, install sign and post to conform to Drawing SP635-3.8.2 and SP635-3.8.3, 2016 Standard Specifications for Highway Construction.
  - .4 For signs on shoulders and soil install sign post as per manufacturer's recommendations and minimum dept of bury of 450 mm. Buried end must have 200 mm long cross bar attached to prevent pullout.
- 3.2 Location
  - .1 Lay out sign locations as per the Contract Drawings.
  - .2 Sign location to be reviewed and approved by DR prior to installation.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement and Payment .1 The unit prices bid for the wood safety railings shall be full compensation for all work necessary and incidental including but not limited to the setting of posts, hardware, cutting, drilling, and installation of wood fencing and railings to the dimensions, lines, and grades indicated in the Drawings and as directed by the DR.
- .2 The unit prices bid for the 600 mm high log rail and the 900 mm high log rail shall include, but not be limited to, the supply and delivery of the wood posts and rails, setting poles in post holes and backfilling, cutting and fitting, drilling holes, fastening, and all other associated work to complete the installation.
- .3 The unit prices bid for the 1400 mm high safety railings, shall include, but not be limited to, supply and delivery of materials, setting poles in post holes and backfilling, cutting and fitting, drilling holes, fastening, and all other associated work to complete the installation.
- .4 Measurement for payment for the safety railings, and log rails shall be linear metre along the top rail of the barriers installed and accepted by the DR.
- 1.2 References .1 Canadian Standards Association (CSA International)
- .1 CSA 080 Series 15, Wood Preservation.
- .2 CSA G164, Galvanizing irregular shapes.
- 1.3 Related Sections .1 Section 01 74 21 – Waste Management and Disposal.
- .2 Section 03 48-00 – Pre-cast Concrete Specialties.
- 1.4 Delivery, Storage and Handling .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Product Requirements and with manufacturers' written instructions.
- .2 Storage and Handling Requirements:
- .1 Store materials off ground and in dry location and in accordance with manufacturer's recommendation in clean, dry, well-ventilated area.
- .2 Store and protect wood from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.
- .4 Exercise care during fabrication, transportation, and erection of wood products.
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**PART 2 - PRODUCTS**

- |                                      |    |  |
|--------------------------------------|----|--|
| 2.1 Materials Supplied by Contractor | .1 | 150mm to 200mm diameter debarked log rails – 2000mm long   |
|                                      | .2 | 150mm to 200mm diameter treated debarked log posts – 1200mm and 1500mm long  |
|                                      | .3 | 150mm to 200mm diameter X 2500 mm log rails  |
|                                      | .4 | Galvanized steel nuts, bolts, washers, spiral spikes to CSA G164.  |
|                                      | .5 | The lengths of posts that will come into direct contact with the soil shall be treated with a non-toxic wood preservative and permitted to cure before returning |

**PART 3 - EXECUTION**

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|------------------|----|--|
| 3.1 Examination  | .1 | Verification of Conditions: verify conditions of ground surface to determine acceptability for product installation in accordance with manufacturers' written instructions.  |
|                  | .2 | Inform DR of unacceptable conditions immediately upon discovery.   |
|                  | .3 | Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval to proceed from DR.   |
| 3.2 Grading      | .1 | Remove debris and correct ground undulations along construction line to obtain a smooth uniform gradient.  |
| 3.3 Installation | .1 | Install members true to line, levels and elevations, square and plumb.   |
|                  | .2 | Construct continuous members from pieces of longest practical length.  |
|                  | .3 | Excavate post holes to dimensions shown on drawings. PVC sleeves for post holes at retaining walls are to be installed concurrent with wall construction.  |
|                  | .4 | Space line posts a maximum of 2.4 m apart, measured parallel to the ground surface or as indicated on the drawings.  |
|                  | .5 | Place posts in post holes, plumb and level for safety railings and fences and tamp approved native excavated material in 100 mm lifts all round to maintain pole in a plum position. Dispose of surplus excavated material. Supply additional material if backfill is not mounded 25 mm above the existing ground. |
|                  | .6 | Nail and/or bolt horizontal rails into place. Railing shall follow the profile of the trail for a continuous visually smooth line along the rails.   |
| 3.4 Cleaning     | .1 | Wipe soil from surfaces.   |
|                  | .2 | Leave Work Area clean at the end of each day.  |
|                  | .3 | Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.  |
-



- .4 Develop Construction Waste Management Plan related to Work of this section and in accordance with Section 01 11 00 – General Instructions and Section 01 35 33 – Health and Safety Requirements.
  - .5 Packaging Waste Management: remove for and return of pallets, crates, padding, packaging materials in accordance with Section 01 11 00 – General Instructions and Section 01 35 33 – Health and Safety Requirements, and 01 35 43 – Environmental Procedures.
  - .6 Waste Management: separate waste materials for recycling in accordance with Section 01 11 00 – General Instructions.
  - .7 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- 3.5 Protection
- .1 Protect installed products and components from damage during construction.
  - .2 Repair damage to adjacent works.

**END OF SECTION**

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**PART 1 GENERAL**

- 1.1 Measurement and Payment .1 The unit prices bid for these items shall be full compensation for all work necessary and incidental for the supply, delivery, and installation of various types of retaining walls and their components to the lines, grades and cross-sections indicated in the Drawings and as directed by the DR.
- .2 Included in the price of the walls are the shaping of the subgrade and foundation pad surfaces, temporary grading, groundwater seepage and surface water management and slope stabilization during excavation and construction, sub-drainage system, including drain rock surround, installation of the Envirogrid cells as shown on the drawings (includes handling, connecting units, large zap strap connectors, granular base infill, infilling, compaction), infilling facing cell with organics concurrent with wall construction, supply and installation of railing foundation post sleeves concurrent with wall construction, premium costs for working around the wall system and any tie-back system and/or adjacent trees/environmentally sensitive zone, and dressing the toe of wall with backfill material, salvaged organics and woody debris as directed by the OEM. Price shall also include costs related to support provided by Titan Environmental at the commencement of wall construction and at other critical intervals as outlined below. All materials and equipment shall be free of invasive species.
- .3 Additional payment under the appropriate tender items shall be made for stripping, excavation and disposal of unsuitable material, excavation, supply/placement/compaction of 75 mm Crushed Granular Subbase and placement biaxial reinforcement grid within the foundation pad zone, placement, and compaction of imported granular fill within the wall prism (i.e. zone behind the Envirogrid cells), supply and compaction of granular base material within the wall prism (for clarity – granular infill of the Envirogrid Cells is part of the wall price in Clause 1.1.2 above), placement of uniaxial geogrids, and safety railings where required. All materials and equipment shall be free of invasive species.
- .4 Measurement for payment for retaining walls shall be per square metre of wall face installed and measured from the bottom of the wall segments to the top.
- .5 Measurement for payment for tie-back geogrids shall be per square metre measured in place for each layer of grid installed, less overlap material.

- 1.2 Scope of Work .1 This Section outlines the requirements for supply, and construction of mechanically stabilized earth (MSE) retaining walls. The wall locations are shown on the Contract Drawings.
- The Work is defined as follows:
- .1 Fabrication and delivery of the walls and all necessary components including but not limited to: Envirogrid wall components. Envirogrid panels to be supplied by Owner.
  - .2 Quality control during fabrication, delivery, and construction of the MSE Wall. As a component of the QC program, a representative of Titan Environmental (supplier of the Parks owned Envirogrid panels) must be on site at the commencement of construction of the first retaining wall and during subsequent critical stages of installation of the walls.
  - .3 The Contractor shall cover the cost of construction, quality control, and project closure documentation including Record Drawings.
- 1.3 Related Work .1 Division 01 – General Requirements.
- .2 Section 01 33 00 – Submittal Procedures
  - .3 Section 31 05 16 – Aggregates.
  - .4 Section 31 24 13 – Highway and Trail Excavation, Embankment and Compaction.
  - .5 Section 31 32 19 - Geotextiles
  - .6 Section 32 11 16 – Granular sub-base (adjust to suit once granular fill spec is prepared).
- 1.4 Reference Standards .1 Construction work is to be in accordance with the following standards and guidelines, except where specified otherwise. All standards are to be the most current issue at time of tender.
- .1 CAN/CSA S6-06, “Canadian Highway Bridge Design Code” (CHBDC) including recent updates.
  - .2 The Canadian Foundation Engineering Manual 4th Edition.
  - .3 AASHTO M288 Geotextile Specification for Highway Applications.
  - .4 AASHTO Standard Specifications for Highway Bridges, and accompanying Commentary, latest edition LFRD.
  - .5 American Society for Testing and Materials (ASTM) where noted.
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- 1.5 Definitions
- .1 MSE: Mechanically Stabilized Earth is soil constructed with artificial reinforcing.
  - .2 Reinforced Backfill: Soil that is used as fill behind the MSE concrete block face, and within the reinforced soil mass.
  - .3 Drain Rock: Free draining aggregate material used in drainage column (Wall 5) and surrounding drainage piping (all walls) . Refer to Section 31 05 16 - Aggregates.
  - .4 Foundation Soil: Soil supporting the leveling pad and reinforced soil zone of the retaining wall system.
  - .5 Geosynthetic: A planar product manufactured from polymeric material used with soil, an aggregate, or other geotechnical engineering materials.
  - .6 Geotextile: A permeable geosynthetic comprised solely of textiles used to separate dissimilar granular materials.
  - .7 Geogrid: A geosynthetic formed by a regular network of tensile elements and apertures, typically used for reinforcement applications.
  - .8 Non-woven Geotextiles: A Geosynthetic made of extruded synthetic polymer fibers or filaments that are needle punched or heat bonded in place into a non-woven mass.
  - .9 Wall Batter: The angle of the exposed face of the wall, as shown on the drawings.
- 1.6 Submittals
- .1 Construction Sequencing and Methodology Plan as outlined in Section 01 33 00
- 1.7 Related Sections
- .1 Section 01 35 43 - Environmental Procedures.
  - .2 Section 01 35 44 – Cultural Resource Procedures.

## PART 2 – PRODUCT

- 2.1 MSE Wall General
- .1 Construction of the MSE wall must follow requirements noted in the referenced geotechnical report and according to manufacturer installation guidelines.
- 2.2 Materials
- .1 Envirogrid Wall system consisting of contained granular base fill capable of supporting a completed wall face at a slope of 4 vertical to 1 horizontal or steeper. All Envirogrid cells shall be filled with compacted granular fill except the front face which shall be filled with nearby salvaged organic materials or as directed by the DR.
  - .2 Drain Rock
    - .1 To Section 31 05 16 – Aggregates.
  - .3 Granular Fill for EnviroGrid walls .1 To Section 31 05 16 – Aggregates – Granular Base.
  - .4 Leveling Pad
    - .1 To Section 31 05 16 – Aggregates - Granular Base (This shall be limited
-

in thickness to less than 75 mm for final shaping of the foundation support zone in preparation for placement of the Envirogrid panels).

- .5 Reinforced Backfill
  - .1 To Section 31 05 16 – Aggregates – Pit Run (typical) or Crushed Granular Sub-base (locally near existing slide area).
- .6 Geogrid used in Reinforced Backfill
  - .1 TE-UX20PET uni-axial geogrids as described in Section 31 32 19 Geotextiles (supplied by PCA)
- .7 Non-Woven (drainage) Geotextile
  - .1 Non-woven geotextiles for used to separate dissimilar granular materials shall be as described in Section 31 32 19 Geotextiles (supplied by PCA)

### PART 3 - EXECUTION

- 3.1 Delivery, Storage and Handling
    - .1 Deliver, store, and handle materials in accordance with manufacturer's recommendations, in such a manner as to prevent damage. Check the materials upon delivery to assure that the appropriate material has been received. Store above ground on wood pallets or blocking. Remove damaged or otherwise unsuitable material, when so determined, from the site.
    - .2 Geosynthetics (including geosynthetic reinforcement, geotextile filter, , Envirogrid material or approved equal) shall be delivered, stored, and handled in accordance with ASTM D4873.
  - 3.2 Installation
    - .1 Installation shall be completed according to wall supplier's instruction. The Contractor must have a supplier's representative on site at the time of construction of the first wall and at during subsequent critical stages of construction.
    - .2 All walls are to be supported on a 0.5 m thick foundation pad constructed with 75 mm minus crushed granular subbase placed and compacted in two lifts to a minimum of 95% Modified Proctor Maximum Dry Density (MPMDD).
    - .3 The foundation pad is to be placed on surface of non-organic, natural subgrade that is approved by the Owner's geotechnical engineer (expected to be firm to stiff clay or firm sandy clay).
      - 1. At Walls 1, 2, 3 and the west end of Wall 4 (i.e. upslope of the buttress), geotechnically approved subgrade is to be covered with a layer of composite grid (TE-BXC30, or approved equivalent);
      - 2. At Wall 4 / buttress a non-woven geotextile separator is to be installed at the natural subgrade/Crushed Granular Subbase interface;
      - 3. At Walls 1 & 2, and locally in the area of Trees 241/242 at Wall 4 a reinforcing layer of TE-BX20PP biaxial geogrid is to be installed at mid depth within the foundation pad; and,
      - 4. At Walls 4 and 5 the uniaxial geogrid reinforcing layers from the buttress
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and Wall 4, respectively, are to extend below the walls within the foundation pad zone.

- .4 Retaining wall designs are based on Envirogrid EGA40 panels and TEUX20PET uniaxial geogrid that Parks has in stock from the previous phase of the project. The EGA panels are 0.9 m wide and two panels are to be secured together at each row with large “zap straps” provided by the manufacturer to form the facing zone;
- .5 Envirogrid cells are to be filled with 19 mm granular base compacted to minimum 95 % MPMDD. The outer cell of the Envirogrid panels is to be filled with salvaged organics that are approved by the OEM;
- .6 Walls shall be constructed with a minimum toe embedment of 0.5 m into mineral soil.
- .7 The wall facing is to be constructed with a batter of 14 degrees relative to vertical (Approximately 1H:4V) or less steep if space permits;
- .8 The handrail post footing sleeve is to be installed at the time of wall construction. Envirogrid panels are not to be cut;
- .9 Wall backfill is to be 75 mm Pit Run in the project documents that is placed and compacted in 200 mm thick lifts to a minimum 95% MPMDD. Locally near the base of the former slide area, wall backfill shall be 75 mm Crushed Granular Subbase;
- .10 Uniaxial geogrid is to be installed at vertical intervals of 400 mm (every second lift). Uniaxial geogrid lengths are measured relative to the back of the organic filled facing cell;
- .11 Locally, at the toe of the buttress, uniaxial geogrid reinforcement from the buttress is to extend into the trail and retaining wall zone as shown on the drawings. Separate geogrid from different structures by a minimum 50 mm thick layer of granular base course material; and,
- .12 Drainage is to be provided as noted for each wall.

**END OF SECTION**

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**PART 1 - GENERAL**

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|------------------------------------|----|---|
| 1.1 Measurement and Payment        | .1 | The unit prices bid for culverts shall be full compensation for all work necessary and incidental for the supply, delivery, and installation for various diameters, dimensions, and materials of culverts as shown on the Contract Drawings and directed by the DR. Payment will be made at the unit price tendered in the Table of unit Prices for each type of culvert work. Locations provided on the Contract Drawings are approximate and will be confirmed on site by the DR. No additional payment will be provided for changes to culvert locations prior to installation.  |
|                                    | .2 | The prices bid shall include, but not be limited to: excavation; disposal of surplus materials; temporary shoring as required; supply and installation of pipe culverts, including couplings, working within the applicable fisheries windows, dewatering; conveying stream flows through or around the work site to prevent contamination, supply, placement and compaction of bedding and backfill materials free of invasive species; compaction testing of placed bedding and granular material; reinstatement; cleaning; and all other work and materials incidental and necessary to complete the Work to provide a complete and functional system in accordance with the Drawings and to the satisfaction of DR. |
|                                    | .3 | Measure for payment for circular culverts shall be per linear metre for each type and size of culvert installed. Measurement for the culvert will be made horizontally from end to end of the culvert.  |
| 1.2 References                     | .1 | ASTM International  |
|                                    | .1 | ASTM C76M, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).   |
|                                    | .2 | ASTM C443M, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).  |
|                                    | .3 | ASTM C850M, Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drain and Sewers with less than 0.6 m of Cover Subject to Highway Loadings.   |
|                                    | .2 | CSA International   |
|                                    | .1 | CSA A3000-[08], Cementitious Materials Compendium.  |
|                                    | .2 | CSA A257 Series-09, Standards for Concrete Pipe and Manhole Sections.   |
|                                    | .3 | CAN/CSA G401, Corrugated Steel Pipe Products.   |
|                                    | .3 | BC Ministry of Environment  |
|                                    | .1 | MOE Standards and Best Practices for Instream Works (2004).   |
| 1.3 Delivery, Storage and Handling | .1 | Deliver, store and handle materials in accordance with manufacturer's written instructions.   |
|                                    | .2 | Delivery and Acceptance Requirements: deliver materials to site in original   |
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factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

- .1 Store materials in accordance with manufacturer's recommendations.
- .2 Store and protect pipe and pipe material from damage.
- .3 Replace defective or damaged materials with new.

- 1.4 Related Sections
- .1 Section 01 35 43 - Environmental Procedures.
  - .2 Section 01 35 44 – Cultural Resource Procedures.

PART 2 –  
PRODUCTS

- 2.1 Corrugated Steel Pipe
- .1 Corrugated steel pipe: to CAN/CSA-G401.
  - .2 Water-tight cut-off collars: as indicated.
  - .3 Steel Spiral Rib Pipe: To CAN3-G401. specification except that the external helical corrugation pattern shall be 19mm x 19mm x 190mm, as described in AASHTO.M.36 or ASTM A760.
  - .4 Steel Spiral Rib Pipe Material: Galvanized or Aluminized Steel Type II to CAN3-G401.
  - .5 Corrugated fluming: to CAN/CSA-G401.
- 2.2 PVC Pipe Profile
- .1 PVC Profile Pipe: PVC profile pipes and fittings conforming to ASTM. F794 and certified to CSA.8182.4, 200 mm to 1200 mm diameters. Fittings to be certified to CSA. B182.2 and conform to ASTM D3034 and ASTM F679.
  - .2 Pipe to have a minimum pipe stiffness of 320 kPa at 5.0% deflection, when tested in accordance with ASTM D2412. Pipe to be marked to clearly indicate class rating as required under ASTM F794.
  - .3 Pipe to have factory assembled spigot gaskets and integral bell joint features.
  - .4 Gaskets to meet requirements of ASTM F477.
  - .5 Normal pipe laying length joint to joint to be 4.0 m.
  - .6 Maximum short term installed deflection not to exceed 5.0% of diameter.
- 2.3 HDPE Plastic Pipe, Open Profile
- .1 HDPE Open Profile Pipe (Corrugated Exterior, Smooth Inner Wall) and Fittings certified to CSA B182.8, 100mm to 900mm diameter.
  - .2 Pipe to have minimum pipe stiffness of 320 kPa at 5.0% deflection, when tested in accordance with ASTM.D2412. Exterior pipe corrugation to be embossed with
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stiffness rating as required by CSA.8182.8.

- .3 Pipe to have factory assembled spigot gaskets and integral bell joint features certified to CSA 8182.8.
- .4 Gaskets to meet requirements of ASTM F477.
- .5 Maximum short term installed deflection not to exceed 5.0% of diameter.

2.3 Granular Bedding and Backfill .1 Refer to Section 31 05 16 – Aggregates, Section 32 11 10 – Select Granular Subgrade Fill, Section 32 11 16 – Granular Sub-Base, and Section 32 11 23 – Granular Base.

### PART 3 - EXECUTION

3.1 Examination .1 Verification of Conditions: verify that conditions at proposed culvert locations are suitable for culvert installations. Notify DR if subgrade or other conditions are unsuitable ~~off~~for culvert.

3.2 Preparation .1 Temporary Erosion and Sedimentation Control:

- .1 Provide details of temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent surroundings to the OEM prior to commencing work. The OEM shall be given sufficient notice to enable the OEM to be present during implementation of these measures.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation is established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 Trenching .1 Do trenching Work in accordance with Section 31 23 33 - Excavating, Trenching, and Backfilling.  
.2 Obtain DR's approval of trench line and depth prior to placing bedding material or pipe.

3.4 Bedding .1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.  
.2 Place 100 mm minimum thickness of approved, compacted granular pipe bedding material on bottom of excavation.  
.3 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding and to camber as indicated or as directed by DR, free from sags or high points.

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- .4 Place bedding in unfrozen condition.
  - 3.5 Laying Corrugated Steel Pipe Culverts
    - .1 Begin pipe placing at downstream end.
    - .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
    - .3 Lay pipe with outside circumferential laps facing upstream and longitudinal laps or seams at side or quarter points.
    - .4 Lay paved invert or partially lined pipe with longitudinal centre line of paved segment coinciding with flow line.
    - .5 Do not allow water to flow through pipes during construction except as permitted by DR.
  - 3.6 Joints: Corrugated Steel Culverts
    - .1 Corrugated steel pipe:
      - .1 Match corrugations or indentations of coupler with pipe sections before tightening.
      - .2 Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.
      - .3 Insert and tighten bolts.
      - .4 Repair spots where damage has occurred to spelter coating by applying two coats of asphalt paint or two coats of zinc rich paint to match pipe coating as approved in writing by DR.
  - 3.7 Laying HDPE and PVC Pipe Culverts
    - .1 Begin pipe placing at downstream end.
    - .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
    - .3 Lay pipe with bell end facing upstream. Excavate a pocket in the bedding material to fit the bell end.
    - .4 Do not allow water to flow through pipes during construction except as permitted by DR.
  - 3.7 Backfilling
    - .1 Backfill around and over culverts as indicated or as directed by DR.
    - .2 Place granular backfill material in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
    - .3 Compact each layer to 95% maximum density to ASTM D698 taking special care to obtain required density under haunches.
    - .4 Protect installed culvert with at least minimum cover of compacted fill recommended by manufacturer before heavy equipment is permitted to cross.
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For HDPE, this is 300 mm.

- .5 During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.
- .6 Place backfill in unfrozen condition.

### 3.13 Fluming

- .1 Assemble and install fluming as indicated.
- .2 Set top edges of fluming flush with side slope.

### 3.14 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - 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 11 - Cleaning.
- .4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management and Disposal.
- .5 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

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**PART 1 -**  
**GENERAL**

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| 1.1 Measurement and Payment             | .1 | The unit price bid for this item shall be full compensation for all work necessary and incidental for the supply, delivery, and installation of all precast concrete barriers, indicated in the Contract Drawings and as directed by the DR. |
|   | .2 | Payment for precast concrete roadside barriers shall be at the unit price tendered for each type of barrier supplied, installed and accepted by the DR. Measurement shall be by count for each type.   |
|   | .3 | Removal and disposal of the existing concrete bull nose shall be considered incidental to the work.  |
| 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 products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.                                |
|   | .3 | Shop Drawings:   |
|   | .1 | Submit shop drawings produced specifically for the project for review.   |
| 1.3 References                          |    | American Society for Testing and Materials International, (ASTM)   |
|   | .1 | ASTM C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).  |
|   | .2 | ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.  |
|   | .3 | ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.  |
|   | .4 | ASTM C827, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.  |
|   | .5 | ASTM C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).   |
|   |    | Canadian Standards Association (CSA)/CSA International   |
|   | .1 | CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).  |
|   | .1 | CAN/CSA-A5-98, Portland Cement.  |
|   | .2 | CAN/CSA-A23.5-98, Supplementary Cementing Materials.   |
|   | .2 | CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.   |
|   | .3 | CAN/CSA-A23.4/A251, Precast Concrete - Materials and Construction/Qualification Code for Architectural and Structural Precast Concrete Products.   |
|   | .4 | CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.  |
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- .5 CSA G30.5, Welded steel wire fabric.
- 1.4 Delivery Storage.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Product and Handling Requirements and with manufacturers' 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 dry location and in accordance with manufacturer's recommendation in clean, dry, well-ventilated area.
  - .2 Store and protect steel from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
  - .4 Exercise care during fabrication, transportation, and erection of steel products.
- .4 Develop Construction Waste Management Plan related to Work of this section and in accordance with Section 01 35 33 – Health and Safety Requirements, and Section 01 74 21 – Waste Management and Disposal.
- .5 Packaging Waste Management: Return for recycling pallets, crates, padding, and packaging in accordance with Sections 01 35 33 – Health and Safety Requirements, 01 35 43 – Environmental Procedures, and 01 74 21 – Waste Management and Disposal.

## PART 2 - PRODUCTS

- 2.1 Materials .1 Concrete mixes and materials to Section 03 30 00 – Cast-in-place Concrete.
- 2.2 Concrete .1 Fabricate: to CAN/CSA-A23.4/A251.  
Roadside Barriers .2 Concrete roadside barriers shall be manufactured to the specifications and dimensions of the Ministry of Transportation and Infrastructure Standard Specifications for Highway Construction, 2016, Section 924 - Precast Reinforced Concrete Barriers.

## PART 3 – EXECUTION

- 3.1 Examination .1 Verification of Conditions: verify that conditions are acceptable for precast concrete barrier in accordance with manufacturer's written instructions.
  - 3.2 Installation of .1 Concrete roadside barriers shall be installed as described in the specifications and dimensions of the BC Ministry of Transportation and Infrastructure Standard Barriers Specifications for Highway Construction, 2016, Section 924 - Precast Reinforced Concrete Barriers.
    - .2 Replace damaged and defective units as directed by the DR.
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- 3.3 Cleaning
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - 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 11 – Cleaning.
  - .4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

**END OF SECTION**

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