

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section.

1.02 PROJECT DESCRIPTION

- .1 The project is to rehabilitate the Greenburn Lake Dam to meet requirements outlined by the Dam Safety Review conducted on the dam in 2012. The project includes reconstruction of the dam and spillway, rebuilding the access road to the dam and constructing a diversion channel around the fire hall located below the dam at the start of the access road.

1.03 PROJECT LOCATION

- .1 The project is located in the Gulf Islands National Park Reserve on South Pender Island. Location of the dam is approximately 17.4 km to the north east of Sidney, BC at Map Grid (NAD 83) coordinates E4484515, N5398870 (Zone 10)

1.04 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general reconstruction Greenburn Lake Dam, spillway and access road as well as a diversion channel below the dam. The work covered under this contract includes but is not limited to the following:
 - .1 Removal of the existing dam and reconstructing it as per the drawings and specifications attached to this project.
 - .2 Removal and reconstruction of the existing spillway and bridge as per the drawings and specifications
 - .3 Moving the outlet control valve from the downstream toe of the dam and constructing a new intake and control valve on the upstream toe of the dam.
 - .4 Reconstructing and resurfacing the existing access road as per the drawings and specifications
 - .5 Construction of a new armoured diversion channel around the fire hall located below the dam adjacent the dam access road.
 - .6

1.05 CONTRACT METHOD

- .1 Construct Work under unit price contract.

1.06 WORK SEQUENCE

- .1 All the Works are to be completed no later than December 15th, 2015
- .2 Schedule work progress to allow Departmental Representative unrestricted access to inspect all phases of the Work.

1.7 CONTRACTOR USE OF PREMISES

- .1 Unrestricted use of site.
- .2 Contractor shall limit uses of the premises for Work, for storage, and for access, to allow:
 - .1 Owner occupancy
- .3 Coordinate use of premises under the direction of the Departmental Representative.
- .4 Due to the limited access to the work areas and the location of historically significant sites adjacent the work areas, the contractor will be restricted to using only the designated work areas for the execution of the Work. Any requirements to utilize areas outside the designated work areas must be approved in writing by the Departmental Representative prior to use.
- .5 The Contractor will be provided a designated laydown area for the duration of the works. If required, obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .6 All Contractor's business and private vehicles are required to display a vehicle work pass from Parks Canada. These permits may be obtained free of charge from the PCA Environmental Surveillance Officer or as directed by the Departmental Representative.
- .7 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .8 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .9 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.08 OWNER OCCUPANCY

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

1.09 OWNER FURNISHED MATERIALS

- .1 Section not used

1.10 CONSTRUCTION SIGNAGE

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall be diamond grade and shall conform to CAN3-Z321.

- .3 Maintain approved signs and notices in good condition for duration of the project, and dispose of off-site on completion of project or earlier if directed by the Departmental Representative.

1.11 EXISTING SERVICES

- .1 Notify the Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Establish location and extent of service lines in area of work before starting Work. The Contractor is responsible for all costs associated with doing locates for services within the work area.
- .3 Where unknown services are encountered, immediately advise the Departmental Representative and confirm findings in writing.
- .4 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .5 Record locations of maintained, re-routed and abandoned service lines.
- .6 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.12 SETTING OUT OF WORK

- .1 Departmental Representative will establish control points and provide:
 - .1 Complete set of Construction Drawings
 - .2 Locations of control points
- .2 Contractor to
 - .1 Set additional control points as necessary
 - .2 Set all work stakes necessary to complete the work.
 - .3 Allow sufficient time to take measurements for payments. The Departmental Representative may need to verify the measurements for payment and the work will be coordinated with the Contractor.
 - .4 Not damage geodetic benchmarks unless authorized by Departmental Representative
- .3 All survey work required by the contractor to layout, monitor, and provide measurements for quantities for payment is considered incidental to the completion of the Works and will not be considered for separate payment.

1.13 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.

- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

1 GENERAL

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

1.02 RELATED REQUIREMENTS

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

1.03 EXISTING SERVICES

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

1.04 USE OF SITE AND FACILITIES

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

1.05 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 The locations of Utilities, if any, shown on the drawings are not necessarily exact nor is there any guarantee that all the Utilities in existence within the limits of the Work Site have been shown on the drawings.
- .3 If it is determined by the Departmental Representative that Utilities affected by the permanent Work will be relocated by Others, the Contractor shall co-operate and coordinate as required with Other Contractors engaged in Utility relocation operations on the Work Site.
- .4 The Contractor shall establish and maintain direct and continuous contact with the owners or operators of any Utilities which may interfere with the Work. The Contractor shall cooperate with them at all times and in all places of Work. The Contractor shall keep the Departmental Representative informed of all communications with the Utility companies and authorities.
- .5 The Contractor shall notify the Departmental Representative and the Utility companies at least seven days in advance of any activities which may interfere with the operation of such Utilities.
- .6 Whenever working in the vicinity of Utilities, the Contractor shall locate such Utilities and expose those that may be affected by the Work, using hand labour as required.
- .7 The Contractor shall assess the possible impact of its operations on all Utilities that may be affected by its operations, and shall protect, divert, temporarily support or relocate, or otherwise appropriately treat such Utilities to ensure they are preserved.
- .8 The Contractor shall Immediately report any damage to Utilities to the Departmental Representative and to the Utility company authority affected, and shall promptly undertake such remedial measures as are necessary at no additional cost to the Owner.

1.06 SURVEY OF EXISTING PROPERTY CONDITIONS

- .1 Submission of tender is deemed to be confirmation that the Contractor has inspected the site and is conversant with all conditions affecting execution and completion of the work.
- .2 The Contractor shall regularly monitor the condition of the Work Site throughout the construction period, and shall immediately notify the Owner if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts, and landscaped areas.
- .3 The Departmental Representative may, but shall not be obligated to survey and record condition of the Work Site and or property on or adjoining the Work Site prior to the commencement of construction by the Contractor. If requested, the Departmental Representative will provide a copy of the survey records to the Contractor for reference.

- .4 The Contractor is required to do an original ground survey prior to the commencement of work in the designated work area which is to be the basis for measuring and calculating quantities for payment for work as designated in Section 01 21 00.
- .5 Whenever supplied with survey records, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative for any area before commencing construction in that area. Commencement of construction in any area shall be interpreted to signify that the Contractor has accepted such survey records as being a true record of the existing conditions prior to construction.
- .6 The provision of the records of a survey of existing condition by the Departmental Representative shall in no way limit or restrict the Contractor's responsibility to exercise proper care to prevent damage to all property within or adjacent to the Work Site, whether all such property is covered by the survey or not.

1.07 PROTECTION OF PERSONS AND PROPERTY

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

1.08 USE OF PUBLIC AREAS

- .1 Off-road construction equipment will not be allowed on the existing public roads except at designated crossing points and loading areas. Steel tracked equipment with cleats will not be allowed on pavement designated for future use. Asphalt, granular, embankment, and excavation materials may be hauled on existing public roads but this shall be standard highway trucks not

exceeding legal highway load limits.

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

1.09 SUPERVISORY PERSONNEL

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

1.10 MEETINGS

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

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

1.11 WASTE DISPOSAL

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

1.12 WORK STOPPAGE

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

2

1.13 PRODUCTS

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Project General Conditions

1.02 TENDER BID ITEMS

.1 L1.0 - Mobilization/Demobilization

- .1 The payment for the work required to mobilize and demobilize equipment and labour forces to perform the work.
- .2 The lump sum payment shall be full compensation for the preparatory work and operations including but not limited to, those necessary for movement of personnel, equipment, buildings, shops, offices, supplies and incidentals to and from project sites. This work shall also include access development and restoration.
- .3 Payment will be done in two parts: 50% payable to mobilize the work and 50% payable upon completion of the work and the work site has been returned to a state deemed acceptable to the Departmental Representative.

L2.0 - Access Road Clearing

- .1 The lump sum payment shall be full compensation for close cut clearing of all shrubs, brush, and trees with a diameter less than 100 mm; offsite disposal of all brush, scrub, roots, stumps and surface debris and stockpiling of merchantable timber as directed by Departmental Representative and all other items necessary for successful completion of the work and acceptance by Departmental Representative. No overhaul will be considered for payment and is considered incidental to the work.
- .2 Payment will be made upon completion of the work and work deemed acceptable by the Departmental Representative.

L3.0 - Access Road Surfacing Gravel

- .1 The price per unit for Access Road Surfacing Gravel shall include all costs for the supply, transport, placement, grading, and all other items necessary for successful completion of the work. The price per unit shall further include all costs associated with excavation and off-site disposal of native materials required to install the surfacing gravel at the surface cross drain. No separate measurement for the excavation or hauling of native materials designated for removal from the access road will be made. No overhaul will be considered for payment and is considered incidental to the work.
- .2 Fill placement to limits shown on Construction Drawings. The quantity of Surfacing Gravel for which payment will be made, shall be for the volume in cubic meters of Surfacing Gravel placed, approved and accepted by the Departmental Representative. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.

L4.0 - Access Road Drainage Slope Riprap

- .1 The price per unit for Access Road Drainage Slope Riprap shall include all costs for the excavation and off-site disposal of existing native

- materials in preparation for riprap, the supply, transport, and placement of the riprap and geotextiles, and all other items necessary for the successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work.
- .2 The quantity of Drainage Slope Riprap for which payment will be made, shall be for the volume in cubic meters of Drainage Slope Riprap placed, approved and accepted by the Departmental Representative. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
- L5.0 - Access Road Interceptor Drain Riprap
- .1 The price per unit of Access Road Interceptor Drain Riprap shall include all costs for the excavation and off-site disposal of existing native materials in preparation for riprap, the supply, transport, and placement of the riprap and geotextiles, and all other items necessary for the successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work.
- .2 The quantity of Interceptor Drain Riprap for which payment will be made shall be by the count of Interceptor Drains installed and accepted by the Departmental Representative.
- L6.0 - Cofferdam Construction
- .1 The lump sum payment shall be full compensation for the excavation and off-site disposal of existing native materials in preparation for the Cofferdam foundation, the supply, transport, placement of Fill, de-watering of excavations, and all other items necessary for the successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work.
- .2 As part of the cofferdam construction, a manhole on the north edge of the lake and within the cofferdam work area will need to be decommissioned. The removal and disposal of this manhole is considered incidental to this work item and will not be measured separately for payment.
- .3 Payment will be made upon completion of the work and work deemed acceptable by the Departmental Representative.
- L7.0 - Embankment Clearing and Grubbing
- .1 The lump sum payment shall be full compensation for clearing and grubbing of trees and brush, removal of all stumps and roots; offsite disposal of all brush, scrub, roots, stumps and surface debris and stockpiling of merchantable timber as directed by Departmental Representative and all other items necessary for successful completion of the work and acceptance by Departmental Representative. No overhaul will be considered for payment and is considered incidental to the work.
- .2 Payment will be made upon completion of the work and work deemed acceptable by the Departmental Representative.
- L8.0 - Spillway Demolition
- .1 The lump sum payment shall be full compensation for demolition of the structure, offsite disposal and all other items necessary for successful completion of the work and acceptance by Departmental Representative.
- .2 Payment will be made upon completion of the work and work deemed

acceptable by the Departmental Representative.

- L9.0 - Soil Excavation, Stockpiling and Wasting
- .1 The price per unit shall include all costs for excavation, stockpiling as needed, off-site disposal, and all other items necessary for successful completion of the work. The price per unit shall further include all costs associated with foundation preparation for the new embankment and work deemed acceptable by the Departmental Representative. No separate measurement for foundation preparation will be made. No overhaul will be considered for payment and is considered incidental to the work.
 - .2 The quantity of excavated materials will be measured in cubic meters in their original location.
 - .1 Common excavation quantities measured will be actual volume removed within following limits:
 - .1 Width for excavation for structures as indicated.
 - .2 Depth from ground elevation immediately prior to excavation, to elevation as directed by Departmental Representative.
 - .2 Rock quantities measured will be actual volume removed within following limits:
 - .1 Width for excavation for structures to be bounded by vertical planes up to 500 mm outside of and parallel to neat lines of footings as indicated.
 - .2 Depth from rock surface elevations immediately prior to excavation, to elevation as indicated.
 - .3 Where design elevation is less than 300 mm below original rock surface, depth will be considered to be 300 mm below original rock surface.
 - .4 Volume of individual boulders and rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.

The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
- L10.0 - Excavation and Stockpiling for Reuse - Low Permeability Core
- .1 The price per unit shall include all costs for excavation, stockpiling as needed, and all other items necessary for successful completion of the work. The price per unit shall further include all costs associated with foundation preparation for the new embankment and work deemed acceptable by the Departmental Representative. No separate measurement for foundation preparation will be made.
 - .2 The quantity of excavated materials will be measured in cubic meters in their original location.
 - .1 Common excavation quantities measured will be actual volume removed within following limits:
 - .1 Width for excavation for structures as indicated.
 - .2 Depth from ground elevation immediately prior to excavation, to elevation as directed by Departmental Representative.

The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.

L11.0 - Fill Placement

- .1 The price per unit shall include all costs for supply, transport, placement, grading, compaction, and all other items necessary for successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work. There will be no separate pay item for tamped fill using hand operated equipment as required around structures. This is applicable to the following Fill types for the Embankment Construction:
 - .1 Low Permeability Fill
 - .2 Sand Filter
 - .3 100 mm Granular Fill
 - .4 Drain Rock
 - .5 Surfacing Gravel
 - .6 Possible Reuse of stockpiled Low Permeable Core
- .2 Fill placement to limits shown on Construction Drawings.
- .3 The quantity of embankment fill for which payment will be made, shall be based on volume in cubic meters of embankment fill placed, approved and accepted by the Departmental Representative. The volume of embankment fill material will be as measured in place following placement using pre placement and post placement surveys. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.

L12.0 - Embankment Geotextile

- .1 The price per unit for Embankment Geotextile shall include all costs to supply, transport, and install in accordance with the requirements of the Specifications, Construction Drawings and to the acceptance of the Departmental Representative.
- .2 The quantity of Embankment Geotextile for which payment will be made, shall be in square meters of surface covered by material as measured in place by post placement survey. No allowance will be made for seams and overlaps.

L13.0 - Embankment Riprap

- .1 The price per unit for Embankment Riprap shall be full compensation for all materials, royalties, permits, hauling of materials, equipment, tools, labour and all other items necessary for successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work.
- .2 Riprap placement to limits shown on Construction Drawings.
- .3 The quantity of Embankment Riprap for which payment will be made is the volume in cubic meters placed, approved and accepted by the Departmental Representative. The quantity shall be determined by measuring the actual slope surface being covered and multiplying the measured area by the specified thickness as indicated on the drawings. Overages in thickness or area beyond the limits shown on the drawings will not be considered for payment unless requested by the Departmental Representative.

L14.0 - Cofferdam Removal

- .1 The price per unit shall include all costs for excavation, stockpiling as needed, off-site disposal, and all other items necessary for successful completion of the work. No overhaul will be considered

- for payment and is considered incidental to the work.
- .2 The quantity of excavated materials will be measured in cubic meters in their original location.
 - .1 Common excavation quantities measured will be actual volume removed within following limits:
 - .1 Width for excavation for structures as indicated.
 - .2 Depth from ground elevation immediately prior to excavation, to elevation as directed by Departmental Representative.
- L15.0 - Mechanical Seeding of Disturbed Areas
- .1 Payment for seeding shall be full compensation for all labour, equipment, materials and incidentals required to place materials in accordance with the requirements of the Specifications, Construction Drawings and direction of the Departmental Representative.
 - .2 The quantity of seeding for which payment shall be made is the total square meters of mechanical seeding installed, approved and accepted by the Departmental Representative. The quantity shall be determined through measurement of the square area defined by the limits indicated on the drawings or as directed by the Departmental Representative. Areas of blending into existing grass will not be measured for payment.
- L16.0 - Soil Excavation, Stockpiling and Wasting Upstream and Downstream of Spillway
- .1 The price per unit shall include all costs for excavation, stockpiling as needed, off-site disposal, and all other items necessary for successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work.
 - .2 The quantity of excavated materials will be measured in cubic meters in their original location.
 - .1 Common excavation quantities measured will be actual volume removed within following limits:
 - .1 Width for excavation for structures as indicated.
 - .2 Depth from ground elevation immediately prior to excavation, to elevation as directed by Departmental Representative.

The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.
- L17.0 - Cast-In-Place Spillway
- .1 The lump sum payment shall be full compensation for all labour, equipment, materials and incidentals required to construct the spillway in accordance with the requirements of the Specifications, Construction Drawings and to the acceptance of the Departmental Representative.
 - .2 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.
 - .3 Payment will be made upon completion of the work and work deemed acceptable by the Departmental Representative.
- L18.0 - Bridge Span
- .1 The lump sum payment shall be full compensation for all labour, equipment, materials and incidentals required to construct the bridge span and railing in accordance with the requirements of the

Specifications, Construction Drawings and to the acceptance of the Departmental Representative.

- .2 Payment will be made upon completion of the work and work deemed acceptable by the Departmental Representative.

L19.0 - Outlet Control

- .1 The lump sum payment shall be full compensation for all labour, equipment, materials and incidentals required to complete outlet upgrades in accordance with the requirements of the Specifications, Construction Drawings and to the acceptance of the Departmental Representative.
- .2 Outlet Upgrade works shall include supply and install:
 - .1 steel walkway with handrail from the crest of the embankment to the existing manhole
 - .2 intake pipe and fish screen
 - .3 cast iron slide gate
 - .4 propeller flowmeter
- .3 Payment will be made upon completion of the work and work deemed acceptable by the Departmental Representative.

L20.0 - Diversion Channel Clearing and Grubbing

- .1 The lump sum payment shall be full compensation for clearing and grubbing of trees and brush, removal of all stumps and roots; offsite disposal of all brush, scrub, roots, stumps and surface debris and stockpiling of merchantable timber as directed by Departmental Representative and all other items necessary for successful completion of the work and acceptance by Departmental Representative. No overhaul will be considered for payment and is considered incidental to the work.
- .2 Payment will be made upon completion of the work and work deemed acceptable by the Departmental Representative.

L21.0 - Diversion Channel Rough Grading

- .1 The price per unit for Rough Grading shall include all preparations, top soil stripping, stockpiling, grading, protection and the loading, hauling, and placing of stripping materials back on contoured slopes as per the requirements of these specifications. No overhaul will be considered for payment and is considered incidental to the work.
- .2 The quantity of Rough Grading for which payment will be made, shall be for the area in square meters of surface graded, approved and accepted by the Departmental Representative. The quantity shall be determined through survey measurement.

L22.0 - Diversion Channel Excavation and Placement

- .1 The price per unit for Diversion Channel Excavation and Placement shall include all costs for excavation, placement, compaction, grading, dewatering, and all other items necessary for successful completion of the work.
- .2 The quantity of Excavation and Placement for which payment will be made, shall be the volume of excavated material surveyed in cubic meters and accepted by the Departmental Representative. The volume of excavated material will be as measured in place prior to excavation using pre excavation and post excavation surveys. The quantity shall be determined through survey measurement of cross-sections and

calculation of volume using average end area methods. The volume of material placed onsite will not be measured for payment.

L23.0 - Diversion Channel Import and Place Common Fill

- .1 The price per unit for Diversion Channel Import and Place Common Fill shall include all costs for supply, transport, placement, grading, compaction, dewatering, and all other items necessary for successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work.
- .2 The quantity of Import and Place Common Fill for which payment will be made, shall be the volume of material placed, surveyed in cubic meters, and accepted by the Departmental Representative. The volume of common fill material will be as measured in place following compaction using pre placement and post placement surveys. The quantity shall be determined through survey measurement of cross-sections and calculation of volume using average end area methods.

L24.0 - Diversion Channel Geotextile Placement

- .1 The price per unit for Diversion Channel Geotextile shall include all costs to supply, transport, and install in accordance with the requirements of the Specifications, Construction Drawings and to the acceptance of the Departmental Representative.
- .2 The quantity of Diversion Channel Geotextile for which payment will be made, shall be in square meters of surface covered by material as measured in place by post placement survey. No allowance will be made for seams and overlaps.

L25.0 - Diversion Channel Placement

- .1 The price per unit shall include all costs for supply, transport, placement, grading, dewatering, and all other items necessary for successful completion of the work. No overhaul will be considered for payment and is considered incidental to the work.
- .2 Armorflex (or approved equivalent) placement to limits shown on Construction Drawings.
- .3 The quantity of Armorflex (or approved equivalent) for which payment will be made, shall be based on area in square meters of Armorflex (or approved equivalent), approved and accepted by the Departmental Representative. The area of Armorflex (or approved equivalent) material will be as measured in place area using post placement surveys.

L26.0 - Diversion Channel Seeding

- .1 Payment for seeding shall be full compensation for all labour, equipment, materials and incidentals required to place materials in accordance with the requirements of the Specifications, Construction Drawings and direction of the Departmental Representative.
- .2 The quantity of seeding for which payment shall be made is the total square meters of mechanical seeding installed, approved and accepted by the Departmental Representative. The quantity shall be determined through measurement of the square area defined by the limits indicated on the drawings or as directed by the Departmental Representative. Areas of blending into existing grass will not be measured for payment.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

- .1 Section 01 11 00 - Summary of Work

1.02 DESCRIPTION

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

1.03 MEASUREMENT PROCEDURES

- .1 Payment shall be made under "Lump Sum Price Item 1 - Mobilization / Demobilization".
- .2 50 % of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete.
- .3 The remainder of the Lump Sum Contract Price for Mobilization and Demobilization to be paid when work is complete and all materials, equipment, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other Agencies having Jurisdiction.

2 PRODUCTS

2.01 PRODUCTS

- .1 Not Used

3 EXECUTION

3.01 EXECUTION

- .1 Not Used

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 ADMINISTRATIVE

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

1.03 PRECONSTRUCTION MEETING

- .1 Within 7 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of Departmental Representative , Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

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

1.04 PROGRESS MEETINGS

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

Greenburn Lake Dam
Rehabilitation
Gulf Islands National Park Reserve
PROJ NO:

PROJECT MEETINGS

SECTION 01 31 19
PAGE 3
2015-04-14

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 MEASUREMENT PROCESURES

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

1.03 REFERENCES

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

1.04 ADMINISTRATIVE REQUIREMENTS

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

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

- .3 Plan to complete Work in accordance with prescribed Project Schedule.
- .4 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.
- .5 Include the requirements of Section 01 14 00 - Work Restrictions and Section 01 35 43 - Environmental Procedures.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

1.06 PROJECT MILESTONES

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

1.07 MASTER PLAN

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

1.08 DETAIL SCHEDULE

- .1 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Plan.
- .2 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.

- .3 Ensure detailed Project Schedule includes as minimum milestones and activity types as follows:
 - .1 Award
 - .2 Permits
 - .3 Submittals
 - .1 Project Schedule
 - .2 List of subcontractors, suppliers, and consultants
 - .3 Contractor Chain of Command including Sub-Contractors and consultants
 - .4 Work Plan
 - .5 Environmental Protection Plan
 - .6 Traffic Management Plan
 - .7 Site Access / Detour Plan
 - .8 Emergency Response Protocol
 - .9 Site Specific Health and Safety Plan
 - .10 Quality Control Plan
 - .4 Mobilization
 - .5 Work Activities grouped by Work Area
 - .6 Interim Inspection
 - .7 Site Clean-up / Demobilization

1.09 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE

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

1.10 PROGRESS MONITORING AND REPORTING

- .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.
- .2 Perform Detail Schedule update monthly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.
- .3 Submit to Departmental Representative copies of updated Detail Schedule.
- .4 Requirements for monthly progress monitoring and reporting are basis for progress payment request.
- .5 Submit monthly written report based on Detail Schedule, showing Work to

date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:

- .1 Description of progress made.
- .2 Pending items and status of: shop drawings, change orders, possible time extensions.
- .3 Status of Contract completion date and milestones.
- .4 Current and anticipated problem areas, potential delays and corrective measures.

1.11 PROJECT MEETINGS

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

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

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

1.02 MEASUREMENT PROCEDURES

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

1.03 ADMINISTRATIVE

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

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

1.04 SHOP DRAWINGS AND PRODUCT DATA

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

- .4 Capacities.
- .5 Performance characteristics.
- .6 Standards.
- .7 Relationship to adjacent work.

- .9 After Departmental Representative's review, distribute copies.

- .10 Submit six (6) prints and one (1) electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

- .11 Submit six (6) copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

- .12 Delete information not applicable to project.

- .13 Supplement standard information to provide details applicable to project.

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

- .15 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.05 SAMPLES

- .1 Not Used.

1.06 MOCK-UPS

- .1 Not Used.

1.07 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.

- .2 Submit transcription of insurance immediately after award of Contract.

1.08 REQUIRED CONTRACTOR SUBMITTALS

- .1 This Clause identifies the plans, programs, and documentation required prior to mobilization on site and during the construction phase.
- .2 **Pre-Mobilization Submittals**
 - .1 Submit the following plans and programs to the Departmental Representative for review a minimum of twenty (20) days prior to mobilization to the project site. The Contractor shall not begin any site work until the Departmental Representative has authorized acceptance of the submittals in writing.
 - .2 The Contractor shall not construe the Departmental Representative's authorization of submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.
 - .1 Project schedule, detailing the schedule of the workdays required from the Contractor, subcontractors, supplier and consultants to complete each activity of the project location in order to meet stages specified in Section 01 11 00. In addition for each activity, critical elements that could impact on the schedule to be identified. Submission shall include both a paper copy of the schedule and an electronic copy in Microsoft Projects format.
 - .2 List of subcontractors, suppliers, and consultants, their role and their key personnel, including names and positions, addresses, telephone and cellular telephone numbers.
 - .3 Contractor Chain of Command, listing key Contractor personnel, including for each name, position, qualification, experience, telephone, and cellular telephone numbers. The list shall include names and telephone/cellular numbers for contact persons who are available on a 24-hour basis in the event of emergencies.
 - .4 Work Plan, describing in detail for each activity by work area the contractor's intended methods of construction, and materials, equipment, and manpower he will use to meet stages specified in Section 01 11 00. The Work Plan has to be linked to the Project Schedule.
 - .5 Quality Control Plan in accordance with Section 01 45 00 - Quality Control.
 - .6 Traffic Management Plan in accordance with requirements of Section 01 35 31 - Special Procedures for Traffic Control.
 - .7 Environmental Protection Plan (EPP) and Environmental Construction Operations Plan (ECO) which shall meet the requirements of Section 01 35 43 - Environmental Procedures.
 - .8 Site Access and Detour Plans. It shall include but not be limited to, engineered Drawings and procedures for accessing all areas of Work or for proposed detours.
 - .9 Survey Plan describing the Contractor's intended methods of

- surveying during this project.
- .10 Contractor shall develop an "Emergency Procedures Protocol" in consultation with Parks Canada. Parks Canada will supply the Contractor with a template with contact names and numbers to be used for this purpose.
- .11 Health and Safety Plan - The Contractor shall have a Certificate of Recognition (COR) or Registered Safety Plan (RSP) including a site specific Health and Safety Plan acceptable to the Departmental Representative. The Contractor shall implement and maintain the Health and Safety Plan during the Work.
- .12 Health and Safety Plan must include:
 - .1 Contractor's safety policy
 - .2 Identification of applicable compliance obligations.
 - .3 Definition of responsibilities for project safety/organization chart for project
 - .4 Site specific hazard assessment
 - .5 General safety rules for project
 - .6 Job specific work procedures.
 - .7 Inspection policy and procedures.
 - .8 Incident reporting and investigation policy and procedures.
 - .9 Occupational Health and Safety meetings.
 - .10 Occupational Health and Safety communications and record keeping procedures.
 - .11 Results of safety and health risk or hazard analysis for site tasks and operation.
- .13 Submit copies of Material Safety Data Sheets (MSDS)
- .14 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .15 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .3 The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of the submittals in writing.
- .2 **Construction Phase Submittals.**
 - .4 Monthly Progress Reports in accordance with Section 01 32 18.
 - .5 Weekly Progress Reports that outline the detailed Work (Contractor, subcontractors, suppliers, consultants) completed to date as well as the anticipated Work to be performed the following week on a day-to-day basis. Work to be linked to activities by area or location identified in project schedule and to provide information on materials, equipment and manpower. Also, alternate Work to be identified if work or a portion of, proposed cannot be done due to weather, equipment breakdown, delays in delivery, etc.
 - .6 Quality Control Inspection Reports - The Contractor shall maintain a daily inspection report that itemizes the results of all Quality Control inspections conducted by the Contractor. The reports shall be made available for review by the Departmental Representative upon request. A summary of all Quality Control Inspections conducted to date shall be submitted by the Contractor with each request for

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 MEASUREMENT PROCEDURES

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

1.03 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS)
- .3 Province of British Columbia
 - .1 Work Safe BC - Occupational Health and Safety Regulations. - Updated 2014.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Contractor's Safety Policy.
 - .4 Definitions of responsibilities for project safety/organization chart for project.
 - .5 General safety rules for project.
 - .6 Job specific safe work procedures.
 - .7 Inspection policy and procedures.
 - .8 Incident reporting and investigation policy and procedures.
 - .9 Occupational Health and Safety meetings.
 - .10 Occupational Health and Safety communication and record keeping procedures.
- .3 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets to Departmental Representative.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative .
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.05 FILING OF NOTICE

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

1.06 SAFETY ASSESSMENT

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

1.07 MEETINGS

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

1.08 REGULATORY REQUIREMENTS

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

1.09 PROJECT/SITE CONDITIONS

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

1.10 GENERAL REQUIREMENTS

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

1.11 RESPONSIBILITY

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

1.12 COMPLIANCE REQUIREMENTS

- .1 Comply with Occupational Health and Safety Regulations, General Safety Regulation, Work Safe BC.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.13 UNFORSEEN HAZARDS

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

1.14 HEALTH AND SAFETY CO-ORDINATOR

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

1.15 POSTING OF DOCUMENTS

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

1.16 CORRECTION OF NON-COMPLIANCE

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

- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.17 BLASTING

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

1.18 POWDER ACTUATED DEVICES

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

1.19 WORK STOPPAGE

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

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 PRECEDENCE

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

1.03 MEASUREMENTS PROCEDURES

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

1.04 NATIONAL PARK REGULATIONS

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

1.05 CANADIAN ENVIRONMENTAL ASSESSMENT ACT

- .1 Execution of the work is subject to the provisions within the Canadian Environmental Assessment Act (CEAA) Guidelines Order of 2003 and subsequent amendments. The Greenburn Lake Dam Project has been subject to an environmental assessment - "Basic Environmental Impact Analysis Greenburn Lake Dam South Pender Island, BC", pursuant to the expectations of the CEAA. Environmental Protection Plans are the next step to achieve the desired end results of minimal adverse environmental effect as the project is constructed.
- .2 Failure to comply with or observe environmental protection measures as identified in these specifications may result in the work being suspended pending rectification of the problems.

1.06 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.
- .3 Environmental Protection Plan must include comprehensive overview of known

or potential environmental issues to be addressed during construction.

- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Include in Environmental Protection Plan:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Descriptions of environmental protection personnel training program.
 - .3 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan.
 - .4 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .5 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 - .6 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
 - .7 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
 - .8 Waste Water Management Plan identifying methods and procedures for management.
 - .9 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.07 START-UP AND ENVIRONMENTAL BRIEFING

- .1 All staff employed at the construction site will be subject to an approximately two hour briefing regarding their individual and collective responsibilities to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. Employees must attend this briefing before beginning their work at the site. Each employee, having received the briefing, will be issued a certification sticker to be displayed on their helmet. It is recognized new employees may join the Contractor's workforce after the initial round of "environmental briefing". In that case and as required, subsequent "environmental briefings" can be presented as numbers warrant, by arrangement with the ESO through the Departmental Representative. Also, some sub-trades may be present at the site for a short time, to perform once-only duties. In these cases, the "environmental briefing" will be replaced by the Contractor explaining the environmental sensitivity at the work location to the sub-trade worker(s), and reviewing highlights of personal conduct expected, with reference to a one-page briefing summary to be provided to the Contractor by the ESO. A copy of this summary will be provided to each sub-trade worker joining the workforce at the site.
- .2 Parks Canada will have an ESO attending the site to monitor the construction activity for conformance with the EPP. The ESO or alternate designated Parks

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

1.08 CONSTRUCTION SITE ACCESS AND PARKING

- .1 In consultation with the Departmental Representative, the Contractor shall formulate an agreement for worker transportation to and from the work sites and where workers shall park their private vehicles. Generally, personal vehicles shall be parked at least 10 metres distance from any watercourse.
- .2 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by worker's vehicles or construction machinery and shall instruct workers so that the "footprint" of the project is kept within defined boundaries.

1.09 SITE MANAGEMENT

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

1.10 FIRES, FIRE PREVENTION AND CONTROL

- .1 Fires and burning of rubbish on site is not permitted.
- .2 A fire extinguisher shall be carried and available for use on each machine. Basic fire fighting equipment recommended (e.g.. a water truck, minimum 500 imperial gallons with 500 feet of fire hose and a pump capable of producing 45 psi water pressure at the nozzle, three shovels, two pulaskis, and two five gallon backpack pumps) shall be maintained at the construction site at location known and easily accessible to all the Contractor's staff. Contractor's staff shall receive basic training in early response to wildfire events during the "environmental briefing".
- .3 The Departmental Representative will indicate possible sources of water for filling the water truck, It will be the Contractor's responsibility

to then gain access to a recommended water source and bear all costs for it's use.

- .4 Construction equipment shall be operated in a manner and with all original manufacturer's safety devices to prevent ignition of flammable materials in the area.
- .5 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented.
- .6 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The ESO and the Departmental representative shall be notified of any fire immediately. If not available, Park Dispatch shall be contacted at (XXX) XXX XXXX

1.11 EROSION CONTROL

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

1.12 EQUIPMENT MAINTENANCE, FUELLING AND OPERATION

- .1 The Contractor shall ensure that all soil and any debris attached to the construction equipment to be used on the project site shall be removed (e.g. power washing) outside the Banff National Park before delivery to the work site.
- .2 Equipment fuelling sites will be identified by the Contractor and approved by the Departmental Representative and the ESO. Except for chain saws, any fuelling closer than 100 meters to streams, wetlands, water bodies or waterways shall required authorization and oversight of the Departmental Representative.
- .3 Diesel and gasoline delivery vehicles, including bulk tankers shall be parked more than 100 meters from streams, wetlands, water bodies or waterways. Gravity fed fuel system are not allowed. Manual or electric pump delivery systems shall be used. Fuelling personnel shall maintain presence at and immediate attention to the fuelling operation.
- .4 Mobile fuel containers (e.g. slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Protection and containment of approved fuel storage sites is addressed in Part 1.14 of this Section.
- .5 Equipment used on the project shall be fuelled with E10, and low sulphur

diesel fuels and shall conform to local emission requirements. The Contractor is to ensure the unnecessary idling of vehicles is avoided.

- .6 Oil changes, lubricant changes, greasing and machinery repairs shall be performed at locations approved by the ESO or the Departmental Representative. Waste lubrication products (e.g. oil filters, used containers, used oil, etc.) shall be secured in spill-proof containers and properly recycled or disposed at an approved facility. No waste petroleum, lubricant products or related materials are to be discarded, buried or disposed of in borrow pits, turnouts, picnic areas, viewpoints, etc anywhere within Banff National Park.
- .7 The Contractor shall ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working order.
- .8 Fuel containers and lubricant products shall be stored only in secure locations specified by the Departmental Representative. Fuel tanks or other potentially deleterious substance containers shall be secured to ensure they are tamperproof and cannot be drained by vandals when left overnight in Banff National Park.

1.13 OPERATION OF EQUIPMENT

- .1 Equipment movements shall be restricted to the "footprint" of the construction area. The work limits shall be identified by stake and ribbon or other methods approved by the Departmental Representative. Unless authorized by the Departmental Representative, activities beyond the work limits are not permitted. No machinery will enter, work in or cross over streams, rivers, wetlands, water bodies or watercourses, nor damage aquatic and riparian habitat or trees and plant communities. Some construction shall require working close to watercourses or water bodies. In these instances, the Contractor is to describe measures to be employed to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) do not enter any watercourses, to the satisfaction of the Departmental Representative and ESO.
- .2 The Contractor shall instruct workers to prevent pushing, placement, leveling, storage or stockpiling of any materials in the trees bordering the right of way or into watercourses or water bodies.
- .3 When, in the opinion of Parks Canada, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at his or her expense, for complete restoration including replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative and ESO.
- .4 Workers private vehicles are to remain within the construction footprint.

1.14 WILDLIFE

- .1 During the Environmental Briefing all personnel shall be instructed by the ESO on procedures to follow in the event of wildlife appearance near or within the work site and any other wildlife concerns.

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

1.15 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies or watercourses the would result in damage to aquatic and riparian habitat. Hazardous or toxic products shall be stored no closer than 100 metre from the Bow River.
- .3 A Spill Response Plan will be prepared as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative and the ESO and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
- .4 The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products shall be in accordance with all applicable federal and provincial legislation.
- .5 An impervious berm shall be constructed around fuel tanks and any other potential spill area. The berm shall be capable of holding 110% of tank storage volumes and shall be to the satisfaction of the Departmental Representative and the ESO before start-up. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double lined fuel tanks can prevent spills into the environment.
- .6 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work by methods that are approved by the Departmental Representative or ESO.
- .7 The Contractor shall provide spill kits at re-fuelling, lubrication, and

repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The ESO and Departmental Representative prior to project start-up must approve these spill kits. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.

- .8 Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative and the ESO shall be notified immediately of any spill. If not available, Park Dispatch will be contacted at xxx xxx xxxx. Spill response cards will be distributed during the initial Environmental Briefing with basic instructions and phone numbers.
- .9 In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
- .10 The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill condition), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the expected standard and to the satisfaction of the Departmental Representative and ESO.

1.16 HISTORICAL/ ARCHAEOLOGICAL CONTROL

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

1.17 WASTE MATERIALS STORAGE AND REMOVAL

- .1 The Contractor and workers shall dispose of hazardous wastes in conformance with the Canadian Environmental Protection Act.
- .2 All wastes originating from construction, trade, hazardous and domestic source, shall not be mixed, but will be kept separate.
- .3 Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried, or discarded at the construction site or elsewhere in Gulf Islands National Park Reserve. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed of at an appropriate waste landfill site or recycler located outside the park. Construction waste storage containers, provided by the Contractor, shall be emptied by the Contractor when 90% full. Waste containers will have lids, and waste loads shall be covered while being transported.
- .4 A concerted effort shall be made by the Contractor and Workers to reduce,

reuse, and recycle materials.

- .5 All efforts to prevent wildlife from obtaining food, garbage, or other domestic wastes shall be made by the Contractor and contract staff while undertaking their work in Banff National Park. Such wildlife attractants shall not be stored at the work site overnight. Lunches, coolers and food products, including waste food products, shall be securely stored away from access by animals. Daily removal of food scraps, food wrappers, pop cans or other attractive products to bear proof containers is mandatory. It is incumbent on the Contractor to notify Parks Canada and make specific arrangements to have garbage collected by Parks Canada when using existing Parks Canada Receptacles.
- .6 The Contractor and workers shall immediately report any circumstances related to food/garbage (e.g. overflowing container or strong smell) and wildlife to the ESO or the Departmental Representative. If neither can be reached, the Contractor/worker shall immediately contact Banff Dispatch at (403) 762 4506 and report the details.
- .7 Sanitary facilities, such as a portable container toilet, shall be provided by the Contractor and maintained in a clean condition.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 CLEARING AND GRUBBING

- .1 The Contractor shall ensure that the substrate of riparian area of streams, rivers or watercourses, whether open water or frozen over shall not be disturbed by tracked, wheeled, or self-propelled equipment. The ESO or Departmental Representative will provide direction in the case of work occurring near any wetland area or watercourses.
- .2 The Contractor shall take all measures to ensure trees do not fall into streams, rivers, wetlands or water bodies or outside the clearing limits as marked by coloured flagging. Generally, work within a 30 meter buffer of watercourses, water bodies or wetlands requires the close oversight of the ESO or the Departmental Representative.
- .3 Trees inadvertently felled into streams, rivers, watercourses or outside the clearing limits shall be removed by means so as to not damage the substrate or any standing trees left outside the clearing limits. Machinery shall not go outside the clearing limits, or into streams, rivers, watercourses or water bodies to remove felled trees.
- .4 Logs and other salvage materials are to be conveyed to and placed in the storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They

shall not be skidded through wetlands, waterways, or water bodies.

- .5 During the grubbing component, stumps, roots, embedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to the waste pit area for chipping by others.
- .6 Existing areas or vegetation disturbed as a result of this contract shall be rehabilitated using approved topsoil from the park and a native grass seed mix as specified by the Departmental Representative or the ESO.

3.02 STRIPPING

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

3.03 MATERIAL LOADING, HAULING AND PLACEMENT

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

3.04 EXCAVATION AND PLACEMENT

- .1 Excavation will be undertaken to the construction drawings.

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

3.05 CONCRETE MANAGEMENT

- .1 Where concrete work is to take place, the EPP must include the following concrete management elements:
 - .1 Concrete mixer truck washout must be contained in an approved facility with wash products taken back to the concrete batching yard for disposal.
 - .2 Rolling concrete mixers with surplus concrete are to returned to the batching yard.
 - .3 Water contaminated on the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.

3.06 FINE GRADING, TOPSOIL PLACEMENT, AND SEEDING

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

3.07 SPECIFIC CONCERNS RELATIVE TO EROSION CONTROL AND SEDIMENTATION

- .1 The Contractor shall prepare an Erosion and Sedimentation Management Plan for the components of the contract that are undertaken in proximity to watercourses, wetlands, or riparian environments. This plan shall be to the satisfaction of the Departmental Representative and ESO. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events.

- .2 An important desired end result is to allow no release into watercourses of sediments in levels that are deleterious to fish or that would harmfully alter, disrupt, or destroy fish habitat. Similarly, there is to be no sediment release into areas of vegetation growth or sensitive areas of sediments in levels that would adversely alter growing or hydraulic conditions. The target is 0 mg/L of TSS over background levels. The threshold is a maximum instantaneous increase of 25 mg/L over background levels when background levels are < 250 mg/L. or a maximum instantaneous increase of 10% over background levels when background levels are > 250 mg/L. This threshold shall not be exceeded.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 MEASUREMENT PROCEDURES

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

1.03 TESTING BY THE CONTRACTOR

- .1 Testing required providing quality control to assure that the Work strictly complies with the Contract requirements shall include, but not be limited to:
 - .1 Testing all structural concrete, grout, reinforcing steel, asphalt concrete pavement, structural backfill, precast concrete box culverts, structural corrugated steel culverts/arches, misc. metals, concrete barriers, retaining walls, and all source acceptance testing; and
 - .2 All testing specified in the Contract Documents; and
 - .3 Any other testing required as a condition for deviation from the specified Contract procedures.
- .2 Testing proposed shall be based on testing requirements in the August 2007 Transportation Standard Specifications for Highway Construction Manual and subsequent updates.
- .3 The Contractor shall be fully responsible and bear all costs for all quality control testing and shall conduct such testing in the following manner:
 - .1 Provide testing facilities and personnel for the tests and inform Departmental Representative in advance to enable the Departmental Representative to witness test if so desired;
 - .2 Notify the Departmental Representative when sampling will be conducted;
 - .3 Within one day after completion of testing submit test results to the Departmental Representative; and
 - .4 Identify test reports with the name and address of the organization performing all the tests, and the date of the tests.
- .4 Approval of tested samples will be for characteristics or use named in such approval and shall not change or modify any Contract requirements.
- .5 Testing agencies, their inspectors, and their representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the Contract Documents, nor to approve or accept any part of the Work.
- .6 The minimum frequency for Quality Control during the embankment construction will be as follows:
 - .1 Embankment Construction with fine grained or granular soil - Standard Proctor by ASTM D698 - 1 per change in material or 1 per week, whichever is more frequent.

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

1.04 Quality Control Program

- .1 The Contractor shall prepare a Quality Control Program. The purpose of the program shall be to ensure the performance of the Work in accordance with the Contract requirements.
- .2 The Quality Control Program shall be described in a Quality Control Manual. The Contractor shall submit the Manual to the Departmental Representative for review in accordance to Section 01 33 00 - Submittal Procedures. The Manual shall develop a logical system for tracking and documenting the Quality Control of the Work. A systematic format and a set of procedures patterned on a recognized Quality Control Standard will be acceptable, subject to review by the Departmental Representative.
- .3 The Quality Control Manual shall include the following information:
 - .1 Distribution list, providing a list of names to whom the Manual shall be distributed
 - .2 Title page including Contract no, revision page with dates of revisions, and a Table of Contents
 - .3 Details of measuring and testing equipment and methods, including calibration
 - .4 Details of special processes as identified by the Departmental representative, including qualifications of personnel and certification.
 - .5 Procedures for shipping, packaging, and storage of materials and equipment.
 - .6 Procedures for maintaining quality
- .7 of any non-conformance, including identification and recording of deficiencies, tagging procedures for "HOLD" or "REJECT" items, and final disposition of non-conformance forms by Quality Control Manager.
- .8 Inspection and test checklists, including tabulated checklists describing all manufacturing and delivery activities such as Inspection or Test, frequency of tests, description of tests, acceptance criteria of tests, such as verification, witnessing or holding tests and sign-off by the Quality Control Manager and the Departmental Representative, if the Departmental Representative witnesses the tests.
- .9 Forms used to ensure application of the inspection and test checklist requirements. These forms shall be identified in the checklists and describe all testing requirements for Specification compliance.
- .4 The Contractor shall appoint a Quality Control Manager who shall report

regularly to the Contractor's management at a level which shall ensure the Quality Control requirements are not subordinated to manufacturing, construction or delivery. The Quality Control Manager shall be empowered by the Contractor to resolve quality matters.

- .5 The Quality Control Manual shall include samples of all forms to be filled in by the Quality Control Inspectors. All forms shall be signed by the Quality Control Manager and submitted promptly to the Departmental Representative who will add its review signature.
- .6 An independent check of all Work shall be performed by the Contractor. The Contractor shall appoint Quality Control Inspectors to ensure compliance of products and workmanship with Contract requirements. The same personnel may not be used to perform a given task and to check the quality and accuracy of the task.
- .7 At completion of the Work a bound and itemized copy of all Quality Control documents and reports shall be prepared by the Contractor's Quality Manager and submitted to the Departmental Representative.

1.05 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.06 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative.

1.07 ACCESS TO WORK

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

1.08 PROCEDURES

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

1.09 REJECTED WORK

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

1.10 REPORTS

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

1.11 TESTS AND MIX DESIGNS

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

1.12 MILL TESTS

- .1 Submit mill test certificates as requested.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

Greenburn Lake Dam
Rehabilitation

QUALITY CONTROL

SECTION 01 45 00

PAGE 5

Gulf Islands National Park Reserve

PROJ NO:

2015-04-13

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Not Used

1.02 MEASUREMENT PROCEDURES

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

1.03 INSTALLATION AND REMOVAL

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

1.04 SITE STORAGE/LOADING

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

1.05 CONSTRUCTION PARKING/TEMPORARY ACCESS

- .1 Provide and maintain adequate access and parking at the project site in areas approved by the Departmental Representative. Parking areas are limited and the Contractor is encouraged to keep on-site parking of non-essential equipment and vehicles to a minimum.
- .2 Build and maintain temporary roads as required during period of Work in locations approved by the departmental representative. Any temporary roads that are constructed must be removed and the area rehabilitated back to original condition. All costs to construct, remove, and rehabilitate any constructions access/temporary roads will be the responsibility of the Contractor.
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor's use of roads.

1.06 SECURITY

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

1.07 OFFICES

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

1.08 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

1.09 SANITARY FACILITIES

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

1.10 CONSTRUCTION SIGNAGE

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

1.11 CLEAN-UP

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 01 52 00 - Construction Facilities

1.02 MEASUREMENT PROCEDURES

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

1.03 INSTALLATION AND REMOVAL

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

1.04 HOARDING

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

1.05 GUARD RAILS AND BARRICADES

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

1.06 ACCESS TO SITE

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

1.07 PUBLIC TRAFFIC FLOW

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

1.08 FIRE ROUTES

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

1.09 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 01 45 00 - Quality Control.

1.02 REFERENCES

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

1.03 QUALITY

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

1.04 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such

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

1.05 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber and miscellaneous metals on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.06 TRANSPORTATION

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

1.07 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract

Time.

1.08 QUALITY OF WORK

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

1.09 CO-ORDINATION

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

1.10 CONCEALMENT

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

1.11 REMEDIAL WORK

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

1.12 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 MEASUREMENT PROCEDURES

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

1.03 REFERENCES

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

1.04 QUALIFICATIONS OF SURVEYOR

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

1.05 SURVEY REFERENCE POINTS

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

1.06 SURVEY REQUIREMENTS

- .1 Contractor is responsible for conducting original ground survey to be used as the basis for measurement for all quantities to be calculated against the contract units.
- .1 Contractor will be responsible for all staking and layout.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, cut and fill.
- .4 Stake slopes and top of embankment as required during construction.

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 01 35 43 - Environmental Procedures.
- .2 Section 01 77 00 - Closeout Procedures.

1.02 MEASUREMENT PROCEDURES

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

1.03 PROJECT CLEANLINESS

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

1.04 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris including that caused by Owner or other Contractors.

- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Inspect finishes, and ensure specified workmanship and operation.
- .8 Sweep and wash clean concreted areas.
- .9 Remove dirt and other disfiguration from exterior surfaces
- .10 Clean drainage systems

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 MEASUREMENT PROCEDURES

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

1.03 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.04 FINAL CLEANING

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

Greenburn Lake Dam	CLOSEOUT PROCEDURES	SECTION 01 77 00
Rehabilitation		PAGE 2
Gulf Islands National Park Reserve		
PROJ NO:		2015-04-14

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 MEASUREMENT PROCEDURES

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

1.03 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.04 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

- .1 Field changes of dimension and detail.
- .2 Changes made by change orders.
- .3 Details not on original Contract Drawings.
- .4 References to related shop drawings and modifications.

- .4 Specifications: mark each item to record actual construction, including:
 - .1 Changes made by Addenda and change orders.

- .5 Other Documents: maintain inspection certifications and field test records required by individual specifications sections.

1.05 FINAL SURVEY

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

1.06 WARRANTIES AND BONDS

- .1 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

- .2 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.

- .3 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

Greenburn Lake Dam	CLOSEOUT SUBMITTALS	SECTION 01 78 00
Rehabilitation		PAGE 3
Gulf Islands National Park Reserve		
PROJ NO:		2015-04-14

END OF SECTION

Section 02 41 16 Structural Demolition

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of structure demolition within the limits of construction including but not limited to demolition of the existing spillway.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 - Payment Procedures
- .2 Section 01 33 00 - Submittal Procedures
- .3 Section 01 35 43 - Environmental Procedures

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures

1.4 REFERENCES

- .1 Reference Standards:
 - .1 CSA International
 - .1 CSA S350-[M1980(R2003)], Code of Practice for Safety in Demolition of Structures.
 - .2 U.S. Environmental Protection Agency (EPA)
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.5 DEFINITIONS

- .1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

1.6 INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Contractor is responsible for fulfilment of reporting requirements.
- .3 Prior to beginning of Work on site submit detailed Work plan and indicate:
 - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled
 - .2 Schedule of selective demolition
 - .3 Number and location of dumpsters

Section 02 41 16 Structural Demolition

- .4 Anticipated frequency of tipping
- .5 Name and address of haulers and waste facilities
- .4 Submit copies of certified receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.
 - .1 Written authorization from Departmental Representative is required to deviate from facilities listed in Work plan.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Ensure Work is performed in compliance with applicable Provincial and Municipal regulations.

1.8 SITE CONDITIONS

- .1 Environmental protection:
 - .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
 - .3 Fires and burning of waste or materials is not permitted on site.
 - .4 Do not bury rubbish waste materials.
 - .5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout project.
 - .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
 - .7 Control disposal or runoff of water containing suspended materials or other harmful substances as directed by Departmental Representative.
 - .8 Protect trees, plants and foliage on site and adjacent properties where indicated.
 - .9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
 - .10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.9 EXISTING CONDITIONS

- .1 Structures to be demolished are based on their condition on date that tender is accepted.

Section 02 41 16 Structural Demolition

Part 2 Products

2.1 SECTION NOT USED

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, according to: Sediment and erosion control plan, specific to site and contained in an approved Environmental Protection Plan and Section 01 3543 Environmental Procedures or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

3.2 DEMOLITION

- .1 Blasting operations not permitted during demolition.
- .2 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.
- .3 Demolish structure.
- .4 At end of each day's work, leave Work in safe and stable condition.
- .5 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.
- .6 Demolish concrete in pieces suitable for disposal as specified.
- .7 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

3.3 CLEANING

- .1 Divert excess materials from landfill to site approved by Departmental Representative.
- .2 Eliminate double handling wherever possible.
- .3 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.
 - .1 Label stockpiles, indicating material type and quantity.
- .4 Transport material designated for alternate disposal using approved haulers and facilities in accordance with applicable regulations.

Section 02 41 16 Structural Demolition

- .5 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
- .1 Disposal facilities must be those approved of and listed in Work plan.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 REFERENCES

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

1.03 MEASUREMENT PROCEDURES

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

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

1.05 DELIVERY, STORAGE AND HANDLING

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

- .3 Hazardous Materials Information System (WHMIS) requirements. Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

2 PRODUCTS

2.01 MATERIALS

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

3 EXECUTION

3.01 CLEANING

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

END OF SECTION

END OF SECTION

Greenburn Lake Dam
Rehabilitation

HAZARDOUS MATERIALS

SECTION 02 81 01

PAGE 4

Gulf Islands National Park Reserve

PROJ NO:

2015-04-14

Section 03 10 00 Concrete Forming and Accessories

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of concrete forming and accessories.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 – Payment Procedures
- .2 Section 01 33 00 - Submittal Procedures
- .3 Section 01 47 15 - Sustainable Requirements: Construction
- .4 Section 01 47 21 - Construction/Demolition Waste Management and Disposal
- .5 Section 02 81 01 - Hazardous Materials
- .6 Section 03 30 00 - Cast-In-Place Concrete

1.3 MEASUREMENTS AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.
- .2 No measurement will be made under this Section.
 - .1 Include forming and accessories in items of concrete work in Section 03 30 00 – Cast-In-Place Concrete.

1.4 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
 - .3 CSA O121-M1978 (R2003), Douglas Fir Plywood
 - .4 CSA O151-09, Canadian Softwood Plywood
 - .5 CSA O153-M1980 (R2003), Poplar Plywood
 - .6 CAN/CSA-O325.0-92(R2003), Construction Sheathing
 - .7 CSA O437 Series-93(R2006), Standards for OSB and Waferboard
 - .8 CSA S269.1-1975(R2003), Falsework for Construction Purposes
 - .9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

1.5 INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Submit shop drawings for formwork and falsework.

Section 03 10 00 Concrete Forming and Accessories

- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 01 - Hazardous Materials.
- .4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts.
- .5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .6 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials in accordance with Section 01 47 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Place materials defined as hazardous or toxic in designated containers.
 - .3 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials.
- .2 Form ties:
 - .1 Use removable or snap-off metal ties, fixed or adjustable length, cw water resistant washer and 25 mm diameter cones in concrete surface.
- .3 Form release agent: non-toxic, biodegradable
- .4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC
- .5 Falsework materials: to CSA-S269.1

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

Section 03 10 00 Concrete Forming and Accessories

- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1.
- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .8 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .9 Use 25 mm chamfer strips on external corners and exposed edges.
- .10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .11 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .12 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 3 days for walls and sides of beams.
 - .2 14 days for beam soffits, slabs, decks and other structural members, or 7 days when replaced immediately with adequate shoring to standard specified for falsework.
 - .3 1 day for footings and abutments.
- .2 Remove formwork when concrete has reached 65 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than [3000] mm apart.
- .5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

Section 03 20 00 Concrete Reinforcing

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of concrete reinforcing.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 - Payment Procedures
- .2 Section 01 33 00 - Submittal Procedures
- .3 Section 01 45 00 - Quality Control
- .4 Section 01 74 11 - Cleaning
- .5 Section 03 30 00 - Cast-In-Place Concrete

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures
 - .1 No measurement will be made under this Section.
 - .1 Include reinforcement costs in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

1.4 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 SP-66-04, ACI Detailing Manual 2004
- .2 CSA International
 - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
 - .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement
 - .4 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .5 CSA W186-M1990 (R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.5 INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with SP-66.

Section 03 20 00 Concrete Reinforcing

- .3 Shop Drawings:
 - .1 Submit drawings
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details
 - .2 Lists
 - .3 Quantities of reinforcement
 - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative
 - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers
 - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3.

1.6 QUALITY CONTROL

- .1 Submit in accordance with Section 01 45 00 - Quality Control.
 - .1 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.
- .3 Develop Construction Waste Management Plan related to Work of this Section.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: billet steel, grade 10 m bars may be grade 300, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.
- .4 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

Section 03 20 00 Concrete Reinforcing

- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

Part 3 Execution

3.1 FIELD BENDING

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

3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.

3.3 CLEANING

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

END OF SECTION

Section 03 30 00 Cast-In-Place-Concrete

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of cast-in-place concrete and shall include but not be limited to the Spillway and bridge deck.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 - Payment Procedures.
- .2 Section 01 33 00 - Submittal Procedures
- .3 Section 01 35 29.06 - Health and Safety Requirements
- .4 Section 01 35 43 - Environmental Procedures
- .5 Section 01 45 00 - Quality Control
- .6 Section 03 20 00 - Concrete Reinforcing
- .7 Section 03 10 00 - Concrete Forming and Accessories

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with Section 01 29 00 - Payment Procedures.
- .2 Cast-in-place concrete in superstructure will not be measured but will be paid for as a fixed price item.
- .3 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.
- .4 Include all direct costs associated with supply, installation and provision of Quality Control (QC) testing for installation of cast-in-place concrete.

1.4 REFERENCES

- .1 Abbreviations and Acronyms:
 1. Portland Cement: hydraulic cement, blended hydraulic cement XXb - b denotes blended and Portland-limestone cement.
 - .1 Type HS and HSb - High sulphate-resistant cement.
- .2 Reference Standards:
 2. ASTM International
 - .1 ASTM C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M-, Standard Specification for Chemical Admixtures for Concrete.
 3. CSA International

Section 03 30 00 Cast-In-Place-Concrete

- .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 With the bid provide proposed Quality Control program including the following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.
 - .8 Mix / materials testing.
- .3 Provide testing results for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 1- QUALITY CONTROL.
- .5 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
- .6 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.
- .7 Provide copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

1.6 QUALITY CONTROL

- .1 Quality Control: in accordance with Section 01 45 00 - Quality Control.
- .2 Provide Departmental Representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .3 Concrete tolerance to CSA A23.1 to tolerance schedule as indicated.

Section 03 30 00 Cast-In-Place-Concrete

- .4 Site Tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 – ACTION AND INFORMATIONAL SUBMITTALS.
 1. Concrete pours.
 2. Slump.
 3. Air content.
 4. Compressive strength at 7 and 28 days.
 5. Air and concrete temperature.
 1. Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.
 6. Ensure testing laboratory is certified to CSA A283.
 1. Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

1.7 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

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

2.3 MATERIALS

- .1 Portland Cement: to CSA A3001, Type HS.
- .2 Blended hydraulic cement: Type HSb to CSA A3001.

Section 03 30 00 Cast-In-Place-Concrete

- .3 Water: to CSA A23.1.
- .4 Aggregates: to CSA A23.1/A23.2.
- .5 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

2.4 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Program.
 - .2 Provide concrete mix to meet following hard state requirements:
 - .1 Compressive strength at 28 age: 30 MPa minimum.
 - .2 Aggregate size 25 mm maximum
 - .3 Aggregate normal – density
 - .4 Class of exposure category S-2 - HS
 - .3 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.
 - .4 Air Content 5-8%

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Departmental Representative's written approval before placing concrete.
 - 1. Provide 24 hours minimum notice prior to placing of concrete.
 - .1 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
 - .2 During concreting operations:
 - 2. Development of cold joints not allowed.
 - 3. Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
 - .1 Pumping of concrete is permitted only after approval of equipment and mix.
 - .2 Ensure reinforcement and inserts are not disturbed during concrete placement.
 - .3 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
 - .4 Protect previous Work from staining.

Section 03 30 00 Cast-In-Place-Concrete

- .5 Clean and remove stains prior to application for concrete finishes.
- .6 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Sleeves and inserts:
 - 1. Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.
 - 2. Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
 - 3. Sleeves and openings greater than 100 x 100 mm not indicated must be reviewed by Departmental Representative.
 - 4. Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
 - 5. Confirm locations and sizes of sleeves and openings shown on drawings.
 - 6. Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor bolts:
 - .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
 - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.
- .4 Drilled holes: to manufacturers' recommendations.
 - .1 Set bolts and fill holes with epoxy grout.
- .5 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .6 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .7 Finishing and curing:
 - .1 Finish concrete to CSA A23.1/A23.2.
 - .2 Provide screed.

Section 03 30 00 Cast-In-Place-Concrete

3.3 SURFACE TOLERANCE

3.4 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Provide appropriate area on job site where concrete trucks and be safely washed.
 - .2 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
 - .3 Prevent admixtures and additive materials from entering drinking water supplies or streams.
 - .4 Using appropriate safety precautions collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.
 - .5 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

Section 05 50 00 Metal Fabrications

Approved: 2010-06-30

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of metal fabrications.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 – Payment Procedures
- .2 Section 01 33 00 - Submittal Procedures
- .3 Section 01 74 11 - Cleaning

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.
- .2 No measurement will be made under this Section.
 - .1 Metal fabrications to be included in other bid items as required.

1.4 REFERENCES

- .1 ASTM International
 - .1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 CSA International
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16, Design of Steel Structures.
 - .4 CSA W48-[06], Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59, Welded Steel Construction.

1.5 INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:

Section 05 50 00 Metal Fabrications

- .1 Indicate materials, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.
- .2 Steel pipe: to ASTM A53/A53M standard weight.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating [600] g/m² to CAN/CSA-G164.

Part 3 Execution

- .1 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.

Section 05 50 00 Metal Fabrications

- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.3 CLEANING

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

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Section 05 50 00.01 Fish Screen

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of the fish screen supply and installation.

1.2 RELATED REQUIREMENTS

- .1 Section 05 50 00 Metal Fabrication
- .2 Section 01 29 00 – Payment Procedures

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures

1.4 INFORMATIONAL SUBMITTALS

- .1 Shop Drawings:
 - .1 Drawing(s) showing screen diameter, screen length, assembly length, interface dimensions for outlet connections, and assembly weight.
 - .2 Indicate materials, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
 - .3 To insure integrity of the intake assembly, welders certified to ASME Section IX shall perform all welding and copies of such certification shall be provided upon request.
 - .4 Strength calculations verifying compliance with design criteria shall be provided on request.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 The intake screen shall be of all-welded continuous slot wedge wire construction to provide both maximum open area and the strength requirements identified herein. The

Section 05 50 00.01 Fish Screen

- inlet slots shall widen inwardly from the screen surface so as to minimize the chance of debris entrapment in the screen openings. The intake assembly shall include internal flow modifiers to provide a low head loss uniform flow field over the entire screen surface.
- .2 The intake assembly capacity shall be 90 l/s at a maximum through-slot velocity, as a result of water withdrawal, of 0.038 m/s. The corresponding average through-slot velocity shall be 90% or more of the maximum velocity.
 - .3 Strength The intake assembly shall be designed to withstand a differential hydrostatic collapse pressure of 6.1 m of water. Design stress used for determining strength of the assembly shall be no more than 90% of the published yield strength of the material used.
 - .4 The intake screen shall be of all-welded continuous slot wedge wire construction to provide both maximum open area and the strength requirements identified herein. The inlet slots shall widen inwardly from the screen surface so as to minimize the chance of debris entrapment in the screen openings. The intake assembly shall include internal flow modifiers to provide a low head loss uniform flow field over the entire screen surface.
 - .5 The surface wire, support beam and stiffener structure shall be an all-welded matrix designed to provide the specified strength with minimal interference with the through screen flow pattern.
 - .6 All structural butt welds shall be full penetration; structural fillet weld size shall be the thickness of the thinner component.
 - .7 End plates and tee body shall be a minimum of 4mm thick

2.2 MATERIALS

- .1 Stainless Steel sections and plates A304 or A304L
- .2 Bolts, anchor bolts: to ASTM A593
- .3 Nuts: to ASTM F594
- .4 Slot The screen slot size shall be 2.54 mm. The open area for this slot opening shall be 50%. Slot size shall be controlled and continuously monitored during manufacture. For slot openings through 2.54 mm the mean slot size shall be within ± 0.005 mm with a standard deviation no greater than 0.002 mm throughout the assembly.

2.3 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- .4 The main outlet flange shall mate with a 200mm (8") pipe.

Section 05 50 00.01 Fish Screen

Part 3 Execution

3.1 INSTALLATION

- .1 Proceed with installation only after receipt of written approval to proceed from Departmental Representative.
- .2 Install and commission in accordance with the manufactures recommendations.

3.2 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Section 230523.02 Valves-Cast Iron

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of supply and installation valves cast iron.

1.2 RELATED REQUIRMENTS

- .1 Section 01 29 00 – Payment Procedures

1.3 REFERENCES

- .1 This specification covers medium duty cast iron sluice gates and operators in which the gate is designed to withstand seating or unseating heads in water supply applications. No AWWA specifications currently cover the use of medium duty cast iron sluice gates.

1.4 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.

1.5 INFORMATIONAL SUBMITTALS

- .1 Provide shop drawings showing the gate assembly's opening size, type of material, schedule of parts and principal dimensions. Gate assembly installation procedures shall also be provided to supplement the shop drawings.

Part 2 Products

2.1 DESIGN PERFORMANCE REQUIREMENTS

- .1 General
 - .1 The gate assembly shall consist of the gate frame and slide, crossbar, gate seat, wedges stem, lift mechanism and accessories. The gate assembly shall be designed, fabricated and shop assembled in accordance with the manufacturer's shop drawings and specifications prior to shipment.
 - .2 The gate assembly shall be designed to the design heads shown below: • Seating Head 6.1m, Unseating Head 3.05m. Seating and unseating heads shall be measured from the water surface to the centre of the gate slide.
- .2 Gate Seat and Frame
 - .1 The cast iron gate seat shall have a flat back configuration suitable for attachment to a round concrete manhole. The self-contained gate frame shall consist of two vertical side guide angles and horizontal head angle, attached to the cast iron gate seat.

Section 230523.02 Valves-Cast Iron

- .2 The cast iron gate slide shall incorporate integral guides to engage the side angles and permit travel of the slide. A horizontal cast iron crossbar, bolted to the gate slide, shall incorporate side wedges that engage wedges mounted to the side angles.
 - .3 The gate slide shall be raised by a rising stem lift system. The stem threads shall be machine cut of the acme type. The bottom of the stem shall be hooked to engage a pocket on the front face of the gate slide. The minimum stem diameters are detailed shall be 22mm.
 - .4 A stainless steel adaptor plate and flange shall be supplied to match the manhole interior curvature and provide a flange matching the gate bolt pattern.
 - .5 Mounting Gaskets and Anchors - The gate shall be mechanically fastened to the mounting surface with anchor bolts or with fasteners. Gasket material shall be butyl rubber sealant.
- .3 Stem Cover and Lifting System
- .1 Stem Covers The stem cover shall be made of aluminum with LEXAN® window. Markings shall be provided in metric units to mark the location of the gate position.
 - .2 Lifting System The lift system shall consist of a hand wheel, or hard crank lift nut, stop nut and housing designed such that the gate can be operated with a maximum of 110N pull. The lift nut shall be cast such that a 51 mm square nut protrudes from the top so that the hand wheel, lift operating extension or T-wrench can be attached. The stop nut shall be furnished to limit the downward travel of the stem when the closed position is reached.
- .4 Materials:
- .1 Seat Cast, Slide, Crossbar, Wedges - Iron A48 Class 30
 - .2 Seating Faces - Aluminum Bronze, ASTM B36, C26000
 - .3 Frame - SSSL (Type 304 or 304L) ASTM A276
 - .4 Adaptor Plate and Flange - SSSL (Type 304 or 304L) ASTM A276
 - .5 Assembly Fasteners - SSSL (Type 304), ASTM F593 (Bolts), ASTM F594 (Nuts)
 - .6 Mounting Gasket - Butyl Joint Sealer (12 mm square)
 - .7 Stem - SSSL (Type 303), ASTM A582
 - .8 Stem Cover Aluminum
 - .9 Lift Housing - Cast Iron A48, Class 30
 - .10 Lift Nut- Cast Zinc Aluminum, ZA12
 - .11 Handwheel Cast Aluminum Cast, AA No. 356.1
 - .12 Paint Amerlok 400

Section 230523.02 Valves-Cast Iron

Part 3 Execution

3.1 INSTALLATION

- .1 Handling and installation of all components shall be in accordance with the manufacturer's shop drawings and installation instructions. If the gate is to be mounted to a concrete wall, extra care should be taken to ensure that the wall is flat and smooth with a maximum variation of 3mm across the mounting surface of the gate.
- .2 After installation of the gate, the seating surfaces shall be cleaned thoroughly of all foreign materials, the stem lubricated (if required) and the final adjustments made. The gate shall then be cycled from the fully closed to the fully open position to ensure smooth operation of the gate.

END OF SECTION

Section 31 11 00 Clearing and Grubbing

Page 1

Part 1 General

1.1 SECTION INCLUDES

- .1 Temporary Erosion and Sedimentation Control
- .2 Preparation
- .3 Clearing
- .4 Grubbing
- .5 Waste Management and Disposal
- .6 Cleaning

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 – Payment Procedures
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 35 43 – Environmental Procedures.
- .4 Section 01 35 29.06 – Health and Safety Requirements.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.

1.4 REFERENCES

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.5 DEFINITIONS

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and stockpiling of felled trees, previously uprooted trees and disposing of stumps, and surface debris.
- .2 Close cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and stockpiling of fallen timber and disposal of surface debris.
- .3 Grubbing consists of excavation and disposal of stumps and roots to not less than specified depth below existing ground surface.
- .4 Merchantable timber is all timber with butt diameter in excess of 150 mm and top down to 100 mm.

Section 31 11 00 Clearing and Grubbing

Page 2

1.6 INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
 - .1 Submit 1 sample of the material listed below for approval prior to delivery of materials to project site.
 - .2 Tree wound paint: one liter can with manufacturer's label.
- .3 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Submit manufacturer's installation instructions.

1.7 QUALITY ASSURANCE

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.8 STORAGE AND PROTECTION

- .1 Prevent damage to fencing trees landscaping natural features bench marks existing pavement utility lines site appurtenances water courses root systems of trees which are to remain.
 - .1 Repair damaged items to approval of Departmental Representative.
 - .2 Replace trees designated to remain, if damaged, as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Bituminous based paint of standard manufacture specially formulated for tree wounds.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to an approved Protection Plan and Section 01 35 43 – Environmental Procedures.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

Section 31 11 00 Clearing and Grubbing

Page 3

3.2 PREPARATION

- .1 Inspect site and verify with Departmental Representative, items designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
 - .1 Notify Departmental Representative immediately of damage to or when unknown existing utility line[s] are encountered.
- .3 Notify utility authorities before starting clearing and/or grubbing.
- .4 Keep roads and walks free of dirt and debris.

3.3 CLEARING

- .1 Clearing includes felling, trimming, cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, rubbish occurring within cleared areas.
- .2 Along the Access Road close cut clear all shrubs, brush, trees with a diameter less than 100 mm (measured at base of tree), and other vegetation designated for removal within the limits of access road clearing shown on the Contract Drawings. Cut all shrubs, brush, trees flush with ground elevation and leave root structure undisturbed. Leave ground surface in a condition suitable for the placement of surfacing gravel.
- .3 In all areas other than the Access Road clear all shrubs, brush, trees and other vegetation designated for removal within the limits of clearing shown on the Contract Drawings. Cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.
- .4 Dispose of all cleared vegetation material at an offsite disposal facility acceptable to the Departmental Representative. Onsite burning is not permitted.
- .5 Remove branches from trees within limits of clearing as directed by Departmental Representative.
- .6 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.
- .7 Notify Departmental Representative of all trees > 100 mm of diameter (measured at base of tree) within Access Road clearing limits. Protect such trees for the duration of the work unless directed otherwise by the Departmental Representative.

3.4 GRUBBING

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

Section 31 11 00 Clearing and Grubbing

Page 4

3.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for disposal offsite in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Dispose of all brush, scrub, roots, stumps and surface debris at an offsite facility acceptable to the Departmental Representative.
- .3 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as merchantable timber.
 - .1 Trim limbs and tops of timber. Merchantable timber or logs that could be made into firewood may be retained by the park for future use.
 - .2 Stockpile merchantable timber on site as directed by Departmental Representative.
 - .3 Details of condition of merchantable timber or firewood to be stockpiled onsite will be directed by the Departmental Representative.
- .4 Remove diseased trees identified by Departmental Representative and dispose of this material offsite.

3.6 CLEANING

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

END OF SECTION

Section 31 22 13 Rough Grading

Part 1 General

1.1 SECTION INCLUDES

- .1 Preparation
- .2 Stripping of Topsoil
- .3 Diversion Channel Grading
- .4 Access Road Grading
- .5 Testing
- .6 Protection
- .7 Cleaning

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 83 - Payment Procedures for Testing Laboratory Services
- .2 Section 01 45 00 - Quality Control
- .3 Section 01 94 11 - Cleaning

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.

1.4 REFERENCES

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .2 ASTM International
 - .1 ASTM D698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- .3 Underwriters' Laboratories of Canada (ULC)

Part 2 Products

2.1 MATERIALS

- .1 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Departmental Representative.
- .2 Topsoil

Section 31 22 13 Rough Grading

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to an approved Environmental Protection Plan and Section 01 35 43 – Environmental Procedures.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

- .1 Inspect site and verify with Departmental Representative, items designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
 - .1 Notify Departmental Representative immediately of damage to or when unknown existing utility line[s] are encountered.
- .3 Notify utility authorities before starting rough grading.
- .4 Keep roads and walks free of dirt and debris.

3.3 STRIPPING OF TOPSOIL

- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined Departmental Representative.
- .2 Commence topsoil stripping of areas as indicated by Departmental Representative after area has been cleared of brush and removed from site.
- .3 Strip topsoil to depths as indicated by Departmental Representative. Avoid mixing topsoil with subsoil.
- .4 Remove rocks >150 mm in diameter and other debris hindering good vegetative growth from topsoil.
- .5 Stockpile in locations as indicated by Departmental Representative. Stockpile height not to exceed 2 m.
- .6 Dispose of unused topsoil off site.

3.4 DIVERSION CHANNEL GRADING

- .1 Rough grade to levels profiles and contours shown on Construction Drawings allowing for surface treatment as indicated.
- .2 Grade to eliminate rough spots and low areas and ensure positive drainage.

Section 31 22 13 Rough Grading

- .3 After placing backfill material as per Section 31 23 33.01 – Excavating and Backfilling, place consolidated stripped topsoil as shown on Construction Drawings to bulk density using equipment accepted by Departmental Representative.
- .4 Leave surfaces “tracked” by bulldozer, or other equipment with impressions parallel to the slope. Topsoil surface to be firm against deep footprinting.
- .5 Maintain finished topsoil surfaces in condition conforming to this section until acceptance by Departmental Representative and the placement of seeding.

3.5 ACCESS ROAD GRADING

- .1 Rough grade to levels, profiles, and contours shown on Construction Drawings allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades:
 - .1 200 mm for cross road drains.
 - .2 500 mm for downslope swales.
- .3 Slope rough grade to downslope side of road.
- .4 Compact filled and disturbed areas to maximum dry density to ASTM D698, as stated in Section 31 23 33.01 – Excavation and Backfilling.
 - .1 98% road.

3.6 PROTECTION

- .1 Protect existing fencing trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.
- .2 Maintain access road to prevent accumulation of construction related debris on road.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification by Departmental Representative, remove surplus materials, rubbish, tools and equipment
- .3 Remaining stockpiled material to be disposed of offsite.

END OF SECTION

Section 31 23 33.01 Excavation and Backfilling

Part 1 General

1.1 SECTION INCLUDES

- .1 This specification includes: placement of surfacing gravel for access road improvements; all required dewatering; construction of cofferdam; diversion channel excavation and fill placement; excavation of existing embankment; and supply and placing fill for embankment construction.

1.2 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 45 00 - Quality Control
- .3 Section 01 35 29.06 - Health and Safety Requirements
- .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .5 Section 01 35 43 - Environmental Procedures
- .6 Section 02 41 13 - Selective Site Demolition

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.
- .2 Include all costs associated with dewatering, excavation, backfilling and compaction, including but not limited to supply installation and the provision of Quality Control (QC).

1.4 REFERENCES

- .1 American Society for Testing and Materials International (ASTM).
 - .1 ASTM C117-[04], Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-[05], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63[2002], Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-[00ae1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D1557-[02e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .7 ASTM D4318-[05], Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)

Section 31 23 33.01 Excavation and Backfilling

- .1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-[03], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-[03], Cementitious Materials for Use in Concrete.
 - .2 CSA-A23.1/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.5 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: solid material in excess of 1.00 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation. Structure excavations of onsite materials to including trenching of a sufficient size and depth required to demolish, remove backfill and replace existing structures to be included as common excavation.
- .2 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .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 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

1.6 INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control:

Section 31 23 33.01 Excavation and Backfilling

- .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
 - .2 Submit for review by the Departmental Representative, proposed dewatering and heave prevention methods as described in PART 3 of this Section.
 - .3 Submit to the Departmental Representative, written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
 - .4 Submit to the Departmental Representative, written notice within 24 hours when bottom of excavation is reached.
 - .5 Submit to the Departmental Representative, testing and inspection results or report as described in PART 3 of this Section.
- .3 Preconstruction Submittals:
- .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
 - .2 Submit records of underground utility locates, indicating: clearance record from utility authority at least 2 weeks prior to start of Work.
 - .3 Submit cofferdam design at least 2 weeks prior to start of Work.
- .4 Samples:
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform the Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
 - .3 Submit 70 kg samples of type of fill specified, in PART 2 of this Section, including representative samples of excavated material.

1.7 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Engage services of qualified professional Engineer who is registered or licensed in the province of British Columbia, Canada in which Work is to be carried out to design and inspect cofferdams, required for Work.
- .3 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .4 Design and supporting data submitted to bear stamp and signature of qualified Professional Engineer registered or licensed in the Province of British Columbia, Canada.
- .5 Keep design and supporting data on site.
- .6 Do not use soil material until written report of soil test results are approved by the Departmental Representative.
- .7 Health and Safety Requirements:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

Section 31 23 33.01 Excavation and Backfilling

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for disposal off site in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert excess aggregate materials from landfill to local quarry or facility for reuse as directed by the Departmental Representative.

1.9 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing work verify location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Confirm locations of buried utilities by careful test excavations.
 - .4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .5 Record location of maintained, re-routed and abandoned underground lines.
 - .6 Confirm locations of recent excavations adjacent to area of excavation.

Part 2 Products

2.1 GENERAL

- .1 Gradations for earthwork materials shall be in accordance with ASTM D422 and ASTM D1140. Specified sieve sizes are based on the nominal sieve opening sizes, in millimetres, under the Canadian Metric Sieve Series in accordance with CAN/CGSB-8.2-M.
- .2 The source of earthwork materials shall be excavation material or off site borrow areas.
- .3 Unless otherwise specified, royalty payments and permitting associated with borrow material will be the responsibility of the Contractor.
- .4 All earthwork materials shall be free of roots, frozen material, organics, and any other deleterious material and foreign substances.
- .5 Granular-type materials shall consist of dense, durable, hard, sound, rounded, rock fragment particles and exhibit less than 12% weight loss after five (5) cycles in accordance with CSA A23.2-9A.
- .6 Where gradation limits are specified, the material shall be well-graded with the results of sieve analyses producing a smooth gradation curve, falling completely within the upper and lower bounds of the envelope, defined by straight lines drawn directly between the specified points. There shall be no excess or deficiency of any particular grain size.

Section 31 23 33.01 Excavation and Backfilling

- .7 Where blending is required, thoroughly mix the sand and gravel materials in a manner that produces a homogeneous fill of the specified gradation, prior to placing or stockpiling the material.
- .8 Crush, screen, wash, or otherwise process sand and gravel products, as required, to achieve specified gradations, except where specified otherwise.

2.2 COMMON FILL

- .1 Common Fill is generally intended for backfill with limited performance requirements. Excavation material is likely to be suitable for use as Common Fill.
- .2 Common Fill shall have a maximum particle size of 200 mm and a smooth gradation curve.

2.3 LOW PERMEABILITY FILL

- .1 Low Permeability Fill shall be native clayey Silt soil, with sufficient fines content to limit the material permeability.
- .2 Material shall be 20 mm maximum size with a minimum of 55% passing the 80 µm sieve.
- .3 Clayey silt shall be low to medium plasticity as classified by the Unified Soils Classification System, with a minimum plasticity index of 7% as determined by ASTM D4318.
- .4 Do not use high plasticity clays with a liquid limit greater than 50%.

2.4 SAND FILTER

- .1 Filter material shall be well-graded sand with a trace of gravel conforming to the following gradation limits:

<u>Sieve Size</u>	<u>Percent Passing by Mass</u>
9.5 mm	100%
4.75 mm	95% – 100%
2.36 mm	80% – 100%
1.18 mm	50% – 85%
600 µm	20% – 60%
300 µm	6% – 30%
150 µm	0% – 10%

- .2 Concrete fine aggregate will likely meet these requirements.
- .3 The slope of a plot of the actual percent passing by mass for any chosen sieve size larger than 630 µm and a second sieve size that is five (5) times the chosen sieve size shall be flatter than 15%.

2.5 100 mm GRANULAR FILL

- .1 Granular Fill materials shall be well-graded sand and gravel conforming to one of the following gradation limits referenced by maximum particle size:

Section 31 23 33.01 Excavation and Backfilling

- .1 100 mm (3") Granular Fill:

<u>Sieve Size</u>	<u>Percent Passing by Mass</u>
100 mm	100%
75 mm	85% - 100%
40 mm	70% - 100%
25 mm	55% - 78%
10 mm	20% - 60%
5 mm	10% - 25%
1.25 mm	0% - 10%

2.6 DRAIN ROCK

- .1 Drain Rock shall be **washed** material conforming to the following gradation limits:

<u>Sieve Size</u>	<u>Percent Passing by Mass</u>
40 mm	100%
20 mm	75% - 100%
10 mm	50% - 100%
4.75 mm	15% - 55%
2.36 mm	5% - 30%
1.18 mm	0% - 15%

2.7 WASTE FILL

- .1 Waste Fill shall be excess excavated material and material not suitable for use as specified for earthworks construction.

2.8 SURFACING GRAVEL

- .1 Surfacing Gravel shall conform to the following requirements.

- .1 The material shall consist of hard durable particles free from clay lumps, frozen materials, organic matter (max 1% by volume, max 2% fine organic matter when tested in accordance with ASTM 02974) and other deleterious materials.
- .2 When tested in accordance with ASTM C136, or latest issues, the material shall have a gradation conforming to the following gradation limits:

<u>Sieve Size</u>	<u>Percent Passing by Mass</u>
19 mm	100%
12.5 mm	70% - 100%
4.75 mm	40% - 70%
2.00 mm	23% - 50%
0.425 mm	7% - 25%
.075 mm	3% - 8%

Section 31 23 33.01 Excavation and Backfilling

- .3 Liquid limit when tested in accordance to ASTM D4318-00, maximum 25.
- .4 Plasticity index when tested in accordance to ASTM D4318-00, maximum 6.
- .5 Los Angles degradation when tested in accordance to ASTM C131-01, maximum percent loss by weight 35.
- .6 Fracture, at least 60% of particles by mass retained on 4.75 mm sieve to have at least on freshly fractured face.

2.9 TOPSOIL (DIVERSION CHANNEL)

- .1 Shall be organic material stripped from the native ground during stripping and temporarily stockpiled for later re-use. Topsoil shall be free of rocks > 25 mm in diameter and other debris hindering good vegetative growth.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, according to sediment and erosion control plan, specific to site, and contained in an approved Environmental Protection Plan and Section 01 35 43 - Environmental Procedures or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION/PROTECTION

- .1 Remove debris, snow, ice, water, and loose material prior to starting fill placement.
- .2 Do not place fill material when the material, the foundation, or the receiving surface is frozen.
- .3 Do not place fill material on any surface until the prepared surface has been inspected by the Departmental Representative, and any defects identified by the Departmental Representative have been rectified.
- .4 Protect surfaces prepared to receive fill from freezing.
- .5 Moisten, if required, and scarify the foundation to a minimum depth of 200 mm to obtain a good bond prior to placing the first lift of fill. Scarification of bedrock and riprap surfaces is not required.

Section 31 23 33.01 Excavation and Backfilling

- .6 Grade and compact the scarified foundation surface to the same density specified for the overlying fill.
- .7 Carefully inspect all excavations before doing any work in the excavations. Look for signs of cracks above slopes, seepage, and any other signs of slope instability or potential for loose material to become dislodged.
- .8 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and the Health and Safety Act for the Province of BC.
- .9 Remove soil blocks, boulders, loose rock and other fragments that may slide or roll into the excavated areas and any accumulations of such materials from the base of excavations.
- .10 Where conditions are unstable, Contractor's Engineer to develop a plan to allow safe access.

3.3 STOCKPILING

- .1 Stockpile fill materials in areas designated by Departmental Representative.
 - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Protect fine grain soils from rain.
- .4 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.4 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide to Departmental Representative for review, details of proposed dewatering or heave prevention methods.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures, and in a manner not detrimental to public and private property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

Section 31 23 33.01 Excavation and Backfilling

3.5 EXCAVATION

- .1 Advise the Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as indicated on Construction Drawings.
- .3 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .4 Dispose of surplus and unsuitable excavated material off site. Stockpile material for re-use as directed by the Departmental Representative.
- .5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Contractor's Engineer.
- .6 Where demolition of existing structures is specified, provide structure excavations of sufficient size and depth to permit the complete removal of the structure and the subsequent backfill with materials specified in the Construction Drawings.
- .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 the Departmental Representative when bottom of excavation is reached.
- .10 Obtain the Departmental Representative approval of completed excavation.
- .11 Correct unauthorized over-excavation as follows:
 - .1 Fill under other areas with fill similar to that to be placed above compacted to the specifications for that material.
- .12 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of the Departmental Representative.

3.6 FILL TYPES AND COMPACTION

- .1 Do not place organic materials in the fill.
- .2 Coordinate excavation and fill placement operations, where practical, to establish efficient construction effort and make efficient use of excavated materials.
- .3 Place fill at the locations, and to the lines, grades, and elevations shown on the Construction Drawings or as established by the Departmental Representative, using specified fill materials placed, conditioned, and compacted to the specified requirements.
- .4 Suspend fill placement operations at any time when, in the opinion of the Departmental Representative, work cannot be performed in accordance with the specifications on

Section 31 23 33.01 Excavation and Backfilling

account of rain, flooding, cold weather, or other unsatisfactory conditions. Cold weather shall be when the atmospheric temperature is below -15°C , unless otherwise authorized by the Departmental Representative. Remove, replace, or rework any fill material or foundation impacted by such conditions at no additional cost to the Owner.

- .5 Overbuild final fill slopes and then trim them to the lines, grades, and elevations shown on the Construction Drawings, or as established by the Departmental Representative.
- .6 Maintain the top surface of fill zones approximately horizontal. During spreading and compaction, provide the surface of the fill zone with a gentle transverse gradient of 3% to 5% so that water from precipitation will drain freely toward the extremities of the fill zone, but away from any filter materials. Immediately, prior to any suspension in fill operations, slope the fill surface at the above gradient and roll with a smooth cylindrical roller so as to leave the surface area in a smooth, even condition for drainage.
- .7 Place and spread fill materials in continuous and approximately horizontal layers of uniform thickness as per Section 3.10 - Compaction in such a manner as to prevent segregation and stratification and to obtain a homogeneous mass.
- .8 Place and spread embankment dam materials in a direction parallel to the dam axis to minimize the potential formation of preferential seepage paths.
- .9 Use discs as necessary during fill placement to mix or blend as required, to obtain a consistent fill material, and to scarify, blend, and break up materials to the full depth of the uncompacted lift.
- .10 Commence placement of fill materials at the lowest elevation of the foundation or excavation and progress in an upslope direction.
- .11 Moisten each previously placed lift, if necessary, and work with discs to a minimum depth of 50 mm to provide a bonding surface, prior to placing the overlying lift of fill material except when, in the opinion of the Departmental Representative, such work cannot be performed because of cold weather.
- .12 Join new fill onto all natural, excavated, or fill slopes by terracing or stepping into the slopes a minimum of 1.5 m wide. Stagger fill joints to minimize the potential for preferred seepage paths in any direction.
- .13 Fill in areas not accessible by larger compaction equipment or which are to be placed within 1000 mm of structures and 600 mm of pipes is to be compacted with hand operated pneumatic or mechanical tamping equipment. The maximum loose lift thickness of 200 mm with stones larger than 80 mm removed.
- .14 Do not place fill material adjacent to cast-in-place concrete structures sooner than 3 days after placement for mass concrete, seven (7) days after placement for walls and deck slabs, or until 75% of the specified compressive concrete strength has been achieved.
- .15 Place fill material equally on all sides of structures to minimize unbalanced loading.

Section 31 23 33.01 Excavation and Backfilling

- .16 Condition, rework, and re-compact or remove, and replace any portion of the fill or foundation that has suffered a reduction in quality due to drying, frost, rain, or any other reason to the specified requirements before placing succeeding layers.
- .17 Reroute construction traffic away from or stabilize areas to the satisfaction of the Departmental Representative where the fill or ground surfaces begin to rut or exhibit instability.
- .18 During placement and compaction operations, direct the movement of equipment to obtain uniform coverage.
- .19 Unless otherwise authorized by the Departmental Representative, maintain no more than 0.5 m maximum difference in elevation between adjacent fill zones, and maintain the temporary slopes within fill zones no steeper than 2H:1V.
- .20 Do not allow construction traffic, including foot traffic, to cross placed filter materials unless adequate measures, acceptable to the Departmental Representative, are in place to prevent contamination, degradation, and over compaction of these materials.
- .21 No heavy construction equipment shall travel over buried structures or pipes unless approved by the Departmental Representative.

3.7 MOISTURE CONTROL

- .1 Moisture content, except for rock materials, shall be within $\pm 2\%$ of the Optimum Moisture Content determined in accordance with ASTM D698.
- .2 The moisture content of fill materials shall be determined in accordance with ASTM D2216.
- .3 Add water to the fill material when its moisture content is below that specified. Use methods that permit water to be added, in controlled amounts, and which do not cause finer materials to be washed out. Work the water into the fill material until the specified moisture content is uniformly obtained throughout the material.
- .4 When the moisture content of the fill material exceeds the specified limits, dry the fill material, prior to compaction, by spreading, discing, and harrowing the fill material until the specified moisture content is uniformly obtained throughout the material.
- .5 Place filter materials in a moist condition to reduce the potential for segregation.
- .6 Add sufficient quantities of water to sand and gravel fill materials during compaction, even when moisture content limits have not been specified, to achieve the required densities.
- .7 Do not add water to the fill material or perform drying operations such as spreading, discing, and harrowing when, in the opinion of the Departmental Representative, such work cannot be performed because of cold weather.

Section 31 23 33.01 Excavation and Backfilling

- .8 As appropriate, mix suitable materials having different in situ moisture contents to obtain the required moisture content. Use discs or other methods to obtain a consistent material with the required uniformity of moisture content.

3.8 COMPACTION

- .1 Lift thickness, compaction requirements, and densities shall conform to the following unless specified otherwise.

Material	Maximum Loose Lift Thickness (mm)	Density Limits
In Situ Foundation	-	≥ 98% SPMDD
Common Fill	300	≥ 95% SPMDD
Low Permeability Fill	200	≥ 98% SPMDD
Sand Filter	300	88% to 92% SPMDD
Surfacing Gravel	150	≥ 98% SPMDD

- .2 Compacted density limits, in Clause 3.5.1, shall be to Standard Proctor Maximum Dry Density (SPMDD) as determined by ASTM D698, or Maximum Vibrated Density (MVD) as determined by ASTM D4253.
- .3 Use compaction equipment of the type, size, and efficiency capable of achieving the specified densities and commensurate with the nature of the fill placement operation.
- .4 Unless otherwise authorized by the Departmental Representative, use a sheepfoot compactor for semi-impervious fill and suitably-sized vibratory smooth-drum rollers for granular materials.
- .5 In areas that are not accessible to larger compaction equipment, or which are within 1000 mm of structures or pipes, or other items susceptible to compaction induced damage, reduce the lift thickness and compact fill materials with hand operated pneumatic or mechanical tamping equipment.
- .6 Apply compaction effort for a minimum horizontal distance of 600 mm on each side of joints in the fill zones.
- .7 Compaction testing for Quality Control to be performed in accordance with Section 01 45 00 – Quality Control.
- .8 Compaction requirements for material that cannot practically be tested and compared to Standard Proctor Densities, compaction effort should be approved by the Departmental Representative.

3.9 TOLERANCES

- .1 Provide finished fill surfaces that are smooth, regular, and uniform.
- .2 Unless specified otherwise, the maximum deviation from the lines, grades, and elevations shown on the Drawings measured normal to the finished surface shall be ± 50 mm.

Section 31 23 33.01 Excavation and Backfilling

- .3 Limit the maximum rate of change in deviation from the specified grade of any surface to a ratio of height to length of 1:50.
- .4 The height and length of the gradual irregularity will be measured normal and parallel, respectively, to the specified grade.
- .5 Embankment dam slopes shall be ± 150 mm measured perpendicular to slope and the Embankment Crest shall be $+ 100$ mm / 0 mm.
- .6 Surfacing Gravel thickness shall be within ± 20 mm of the design lines.

3.10 WASTE FILL

- .1 Waste Fill to be disposed of offsite.

3.11 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 - Construction/Demolition Waste Management and Disposal, trim slopes, and correct defects as directed by the Departmental Representative.
- .2 Replace topsoil as indicated by the Departmental Representative.
- .3 Clean and reinstate areas affected by Work as directed by the Departmental Representative.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

3.12 PROTECTION (SURFACING GRAVEL)

- .1 Maintain finished surfacing gravel in condition conforming to this section until project completion. If required repair surfacing gravel at the completion of the project. Ensure surfacing gravel is free of ruts or any other damage caused by movement of construction equipment or materials on the access road.

END OF SECTION

Section 31 32 19.01 Geotextiles

Part 1 General

1.1 SECTION INCLUDES

- .1 Installation
- .2 Waste Management and Disposal
- .3 Cleaning
- .4 Protection

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 – Payment and Procedures.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 35 43 – Environmental Procedures.
- .4 Section 01 74 11 – Cleaning.
- .5 Section 31 22 33 01 – Excavating and Backfilling.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment and Procedures.
- .2 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

1.4 REFERENCES

- .1 ASTM International
 - .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, Standard 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-[2004], Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.

Section 31 32 19.01 Geotextiles

- .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 CSA International
- .1 CSA G40.20/G40.21-04(R2009), 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.

1.5 INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit to Departmental Representative the following:
 - .1 Manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit to the Departmental Representative the following samples at least 2 weeks prior to beginning of work for each type of geotextile used on the project.
 - .1 Minimum Length of 1 m of roll width of geotextile.
 - .2 Minimum of 1 m seam with at least 300 mm of geotextile on both sides of seams.
- .4 Test and Evaluation Reports.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect geotextiles from direct sunlight and UV rays.
 - .3 Replace defective or damaged materials with new.

Section 31 32 19.01 Geotextiles

Part 2 Products

2.1 MATERIAL

- .1 Geotextile shall be a non-woven synthetic fibre fabric, supplied in rolls. Nilex 4510E or pre-approved equivalent.
 - .1 Width: 3.5 m minimum.
 - .2 Length: 50 m minimum.
 - .3 Composed of: minimum 85% by mass of polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
- .2 Physical properties:
 - .1 Tensile strength and elongation (in any principal direction): to ASTM D4595.
 - .1 Tensile strength: minimum 1000 N, wet condition.
 - .2 Elongation at break: maximum 50%.
 - .3 Seam strength: equal to or greater than tensile strength of fabric.
 - .3 Hydraulic properties:
 - .1 Apparent opening size (AOS): to ASTM D4751, 0.150 micrometres.
 - .2 Permittivity: to ASTM D4491, 1.5 pers.
- .4 Securing pins and washers: to CSA G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA-G164.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, according to sediment and erosion control plan, specific to site, and contained in an approved Environmental Protection Plan and Section 01 35 43 - Environmental Procedures or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION/PROTECTION

- .1 Remove debris, snow, ice, water, and loose material prior to geotextile placement.
- .2 Do not place geotextile when receiving surface is frozen.
- .3 Do not place geotextile on any surface until the prepared surface has been inspected by the Departmental Representative, and any defects identified by the Departmental Representative have been rectified.

Section 31 32 19.01 Geotextiles

- .4 Grade and compact the scarified foundation surface to the same density specified for the overlying fill.
- .5 Carefully inspect all excavations before doing any work in the excavations. Look for signs of cracks above slopes, seepage, and any other signs of slope instability or potential for loose material to become dislodged.
- .6 Remove soil blocks, boulders, loose rock and other fragments that may slide or roll into the excavated areas and any accumulations of such materials from the base of excavations.

3.3 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with pins.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5 Pin successive strips of geotextile with securing pins at 1000 mm interval at mid point of lap.
- .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .7 After installation, cover with overlying layer within 4 hours of placement.
- .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .9 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating and Backfilling and Section 31 37 00 – Riprap.

3.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for disposal and/or recycling offsite approved by Departmental Representative.

3.5 CLEANING

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

3.6 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Section 31 37 00 - Riprap

Part 1 General

1.1 SECTION INCLUDES

- .1 Measurement procedures
- .2 Waste Management and Disposal
- .3 Riprap
- .4 Placing
- .5 Tolerances
- .6 Cleaning

1.2 RELATED REQUIREMENTS

- .1 Section 01 35 31 – Special Procedures for Traffic Control.
- .2 Section 01 35 43 – Environmental Procedures.
- .3 Section 31 23 33.01 – Excavating and Backfilling.
- .4 Section 31 32 21 – Geotextiles.
- .5 Section 01 74 11 – Cleaning.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 – Environmental Procedures.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Divert left over geotextiles to recycling facility.

Part 2 Products

2.1 RIPRAP

- .1 Riprap shall consist of sound, hard, durable particles free from silt, clay, shale, sandstone, flaky particles, topsoil, organic matter, and other deleterious material.
- .2 Riprap particles shall be and free from cracks, seams, and other defects that would increase potential for degradation from frost and water action.
- .3 The ratio of maximum to minimum dimensions of individual pieces shall not exceed 3.0.

Section 31 37 00 - Riprap

- .4 Gradation limits shall be as follows referenced by unit weight:
 - .1 CLASS 25 kg Riprap:
 - .1 Not More than 15% of total volume of stones with individual size less than 120 mm.
 - .2 Not less than 50% of total volume of stones with individual size of 260 mm or more.
 - .3 Remaining percentage of total volume to have uniform distribution of stones between 50 and 300 mm size.

2.2 GEOTEXTILE FILTER

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

Part 3 Execution

3.1 RIPRAP PLACEMENT

- .1 Surfaces to receive riprap and riprap bedding may be frozen.
- .2 Place riprap and riprap bedding by backhoe, or similar lifting equipment. Do not end-dump and push riprap and riprap bedding into place on slopes.
- .3 Do not cause segregation, particle damage, breakdown, or excessive displacement of the previously placed riprap and riprap bedding. Replace or repair damaged or displaced material.
- .4 Obtain the specified distribution of the various sizes of particles throughout the mass by using selective loading, by controlled dumping of successive loads during placing, or using other methods.
- .5 Commence placement of riprap and riprap bedding from the toe of the slope and proceed up slope.
- .6 Place riprap and riprap bedding to its full thickness in one operation.
- .7 Compaction of riprap is not required.
- .8 Place riprap in a closely packed arrangement such that smaller rocks fill the voids between larger rocks and there are no unfilled spaces that would permit the escape of underlying layers of placed materials. Interlock particles and dress slopes as required.
- .9 Rearrange rocks, as required, to eliminate any tendency of the rocks to move or slide after placement.
- .10 Do not break riprap particles after placement.
- .11 Equipment shall not travel on riprap and riprap bedding.

Section 31 37 00 - Riprap

3.2 TOLERANCES

- .1 Place riprap within a tolerance of +100 mm of the specified thickness, and within a tolerance of +100 mm of the specified lines, grades, and elevations.

3.3 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification by Departmental Representative, remove surplus materials, rubbish, tools and equipment.
- .3 Remaining stockpiled material to be disposed of offsite.

END OF SECTION

Section 32 92 19.13 Mechanical Seeding

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of mechanical seeding and fertilizing of disturbed areas within the limits of construction.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 – Payment Procedures.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 35 29.06 - Health and Safety Requirements.
- .4 Section 01 35 43 - Environmental Procedures.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.

1.4 INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for seed, and fertilizer.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
- .3 Samples:
 - .1 Submit 0.5 kg container of each type of fertilizer used.
- .4 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Seed to be stored in dry weatherproof place and shall be protected from damage by heat, rodents and other causes. Deliver and store grass in original packages with label indicating:
 - .1 Analysis of seed mixture

Section 32 92 19.13 Mechanical Seeding

- .2 Percentage of pure seed by weight
- .3 Year of production
- .4 Net mass
- .2 Replace defective or damaged materials with new.

1.6 WARRANTY

- .1 For seeding, 12 months warranty period is extended to 1 full growing season.
- .2 Contractor hereby warrants that seeding will remain free of defects in accordance with General Conditions CCDC [GC 12.3], but for 1 full growing season.
- .3 End-of-warranty inspection will be conducted by Departmental Representative.

Part 2 Products

2.1 GRASS SEED

- .1 Coastal Native Bunchgrass Mixture in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
 - .1 Grass seed mixture.

By Weight	Species
49.5	Jeune Alaska Brome Grass
49.5	Alberni Blue Wildrye
1	Schoen Slender Hairgrass

- .2 In packages individually labelled in accordance with "Seeds Regulations" and indicating name of supplier.

2.2 WATER

- .1 Free of impurities that would inhibit germination and growth.

Part 3 Execution

3.1 SEED BED PREPARATION

- .1 Do not perform work under adverse field conditions as determined by Department Representative.
- .2 Remove and dispose of weeds, debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials, off site in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Section 32 92 19.13 Mechanical Seeding

- .3 Fine grade surface free of humps and hollows to smooth, even grade, to contours to tolerance of plus or minus 15 mm, surface draining naturally.

3.2 SEED PLACEMENT

- .1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.
- .2 For mechanical seeding:
 - .1 Mechanical landscape drill seeder ("Brillion" type or equivalent) which accurately places seed at specified depth and rate and rolls in single operation.
 - .2 Use equipment and method acceptable to Departmental Representative.
- .3 For manual seeding:
 - .1 Use manually operated drop seeder ("Cyclone" type or equivalent).
 - .2 Use manually operated, water ballast, landscaping type, smooth steel drum roller. Ballast as directed by Departmental Representative.
 - .3 Use equipment and method acceptable to Departmental Representative.
- .4 Blend applications 150 mm into adjacent grass areas and previous applications to form uniform surfaces.
- .5 Sow half of required amount of seed in one direction and remainder at right angles as applicable.
- .6 Incorporate seed by light raking in cross directions.
- .7 Consolidate mechanically seeded areas by rolling area if soil conditions warrant or if directed Departmental Representative with equipment approved by Departmental Representative immediately after seeding.

3.3 CLEANING

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

3.4 PROTECTION

- .1 Erect plastic snow fence around newly seeded areas sufficient to protect against deterioration due to pedestrian or other traffic.

3.5 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Ensure maintenance is carried out under supervision of certified Landscape Maintenance Supervisor.
- .2 Perform following operations from time of seed application until acceptance by Departmental Representative:
 - .1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
 - .2 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.

Section 32 92 19.13 Mechanical Seeding

3.6 FINAL ACCEPTANCE

- .1 Seeded areas will be accepted by Departmental Representative provided that:
 - .1 Areas are uniformly established free of rutted, eroded, bare or dead spots and extent of weeds apparent in grass is acceptable.
 - .2 Areas have been fertilized.
- .2 Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.7 MAINTENANCE DURING WARRANTY PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period.
 - .1 Water seeded area to maintain optimum soil moisture level for continued growth of grass. Control watering to prevent washouts.
 - .2 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.
 - .3 Control weeds by mechanical means utilizing acceptable integrated pest management practices. Hand pulling of weeds may be required. This work is incidental to the contract.

END OF SECTION

Section 331200 Flow Meters

Part 1 General

1.1 SECTION INCLUDES

- .1 The work covered by this specification shall consist of flow meters and installation.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 – Payment Procedures

1.3 REFERENCES

- .1 American Water Works Association Standard NO. C704-12 Propeller-Type Meters for Waterworks Applications

1.4 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment Procedures.

1.5 INFORMATIONAL SUBMITTALS

- .1 Installation and Operation Manual or equivalent
- .2 Warranty Statement or equivalent

Part 2 Products

2.1 DESIGN PERFORMANCE REQUIREMENTS

- .1 Size and Flow
 - .1 The nominal meter size shall be 200mm (8")
 - .2 Corrosion-resistant materials shall be used throughout the mechanical enclosure
 - .3 Except for the register assembly, no aluminum materials shall be used, and all non-stainless steel surfaces shall be treated with a fusion-bonded impervious coating.
 - .4 All rotating members, except members in the register assembly, shall be mounted on stainless steel radial ball bearings. Sleeve type or ceramic bearings are not acceptable.
 - .5 Head loss shall not exceed 300mm of water at a maximum flow of 90 l/s. F. Flow meter system accuracy shall be +/-2% of true flow rate within the range specified.
- .2 Meter Body
 - .1 The meter shall comply with the applicable provisions of the American Water Works Association Standard NO. C704-91 for cold water meters.

Section 331200 Flow Meters

- .2 The impeller shall be made of a plastic or other corrosion-resistant material of a rigid but resilient nature that will not flex or otherwise change in dimension under a high flow of water and be capable of withstanding temperatures of up to 70° C.
 - .3 Impellers will be factory tested and adjusted to maintain an accuracy of +/-2% over the normal flow range and remain accurate without the use of change gears.
 - .4 The impeller shall be mounted on a non-corrosive shaft and bearing assembly and shall have a provision for sustaining thrusts at maximum flows. The impeller shall be magnetically coupled to connecting shafts through a sealed housing to eliminate corrosion and friction.
 - .5 The drive mechanism from the impeller coupling to the register shall be a flexible driveline and shall be lubricated and sealed at the factory.
 - .6 The meter instrument shall be driven by axial alnico magnets located on the impeller shaft and on the same axis and shall be completely sealed from water pressure.
- .3 Register
- .1 The register shall be on a common axis with the impeller support and shall be rigidly supported by the housing support plate or drop pipe.
 - .2 The register shall consist of an instantaneous indicator and totalizer which shall be mounted perpendicular to the direction of flow and which can be viewed through a transparent cover.
 - .3 The totalizer shall be six-digit, straight-reading, driven by a positive direct drive mechanism from the impeller coupling, and shall register cubic meters
 - .4 The flow indicator shall show flows instantaneously, and be driven by a magnet drag mechanism from the impeller coupling.
 - .5 The flow rate indicator shall indicate flow in liters per second
 - .6 The register assembly shall be factory lubricated and sealed water-tight for infrequent submersion.

Part 3 Execution

3.1 PREPARATION

- .1 Install in accordance with manufacturer's written instructions and approved submittals.
- .2 Locate meter as recommended by manufacturer with respect to other piping components to ensure flow meter will meet specified accuracy.

END OF SECTION

Section 31 XXXX Articulating Concrete Blocks

Part 1 General

1.1 SECTION INCLUDES

- .1 This specification addresses the installation procedures for correct placement of articulating concrete block (ACB) revetment system in order to achieve the desired hydraulic performance and stability required to withstand erosive forces.

1.2 RELATED REQUIREMENTS

- .1 Section 01 29 00 – Payment and Procedures.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 35 43 – Environmental Procedures.
- .4 Section 01 74 11 – Cleaning.
- .5 Section 31 22 33 01 – Excavating and Backfilling.
- .6 Section 31 32 21 – Geotextiles.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

- .1 Measurement and Payment Procedures: in accordance with the applicable item as defined by Section 01 29 00 – Payment and Procedures.
- .2 Measure articulating concrete blocks in square metres of surface covered by material

1.4 REFERENCES

- .1 Not Used

1.5 INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit to Departmental Representative the following:
 - .1 Manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit to the Departmental Representative a cell sample at least 2 weeks prior to beginning of work for each type of ACB used on the project.
- .4 Proposed seating method at least 1 week prior to beginning ACB installation.

Section 31 XXXX Articulating Concrete Blocks

1.6 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIAL

- .1 ACB shall be Armorflex Class 40 Open Celled product or approved equivalent.
- .2 Cell Dimensions: 44.2 cm by 39.4 cm by 12 cm

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, according to sediment and erosion control plan, specific to site, and contained in an approved Environmental Protection Plan and Section 01 35 43 - Environmental Procedures or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION/PROTECTION

- .1 Areas on which geotextile and ACB units are to be placed shall be constructed to lines and grades shown on the Construction Drawings as well as to the tolerances specified in the Contract Documents and approved by the Departmental Representative
- .2 Remove debris, snow, ice, water, and loose material prior to geotextile placement.
- .3 Do not place geotextile when receiving surface is frozen.
- .4 Do not place geotextile on any surface until the prepared surface has been inspected by the Departmental Representative, and any defects identified by the Departmental Representative have been rectified.
- .5 Carefully inspect all excavations before doing any work in the excavations. Look for signs of cracks above slopes, seepage, and any other signs of slope instability or potential for loose material to become dislodged.
- .6 Remove soil blocks, boulders, loose rock and other fragments that may slide or roll into the excavated areas and any accumulations of such materials from the base of excavations.

Section 31 XXXX Articulating Concrete Blocks

- .7 Transitions between the lands contours shall compacted and graded to facilitate the installation of the ACB system to maintain intimate contact throughout the system. Grade and compact the scarified foundation surface to the same density specified for the overlying fill.
- .8 The slope shall be graded to a smooth plane to ensure that intimate contact between the slope face, geotextile and bottom surface of the ACB. Drag a flat ridged bar or beam of 3 metre minimum length along the slope to assist in smooth grade preparation, or approved similar method. All slope deformities such as roots, grade stakes and stones that impair the local slope face must be removed. Holes, footprints or other voids greater than 3 cm in depth normal to the local slope face shall not be permitted. No groves or depressions greater than 1.5 cm depth normal to the local slope face with a dimension exceeding 30 cm in any direction shall be permitted. Where such areas are evident, they shall be brought to grade by placing and compacting common fill.
- .9 Any area that becomes unacceptable prior to ACB installation shall be regarded, recompacted or replaced at the discretion of the Departmental Representative.

3.3 INSTALLATION

- .1 Place geotextile material as specified in Section 31 32 19.01 - Geotextile. The geotextile shall extend 0.75 m beyond the extent of the ACB.
- .2 Care shall be taken while installing the ACB system to avoid damage to the geotextile and to the concrete units.
- .3 The ACB units shall be placed on the geotextile in such a manner as to produce a smooth plane surface in intimate contact with the geotextile.
- .4 No individual unit within the plane of the system shall protrude more than 1.5 cm or as otherwise specified by the Departmental Representative.
- .5 The units shall be placed side by side so that the blocks abut each other.
- .6 The units shall be seated by a method approved by the Departmental Representative.
- .7 The system placement shall begin at the base of the slope and then proceed to the top of the slope.
- .8 The finished upstream edge should be in a toe trench approved by the Departmental Representative to protect it against erosive forces.
- .9 Exposed finished edges of the ACB shall be backfilled and compacted until flush.

3.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for disposal and/or recycling offsite approved by Departmental Representative.

3.5 CLEANING

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

Section 31 XXXX Articulating Concrete Blocks

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

3.6 PROTECTION

- .1 Vehicular traffic not permitted directly on ACB.

END OF SECTION