Parks Canada Parcs Canada

SPECIFICATIONS FOR

HORSESHOE LAKE DAM RECONTRUCTION

Issue: FOR TENDER

WSP PROJECT No: 121-15275-51

PCA PROJECT No: 30025849

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END OF SECTION

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END OF SECTION

PART 1 - GENERAL

1.1 PRECEDENCE

.1 For Federal Government Projects Division 1 sections take precedence over technical specifications in other Divisions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract is comprised of the demolition and reconstruction of the Horseshoe Lake Dam, located in Minden Hills, Ontario on the Gull River; and further identified as Parks Canada Project Number 30025849.

.2 Work includes demolition and removal of the existing Horseshoe Lake Dam, including the west access wingwall and stairs, the concrete deck, the concrete piers, embedded metals, the abutments and the partial demolition and removal of the sill, as shown on the drawings.

.3 Work includes the careful removal, in a manner to prevent damage, of all signage and railings at the site. These items are intended to be salvaged and reused and will remain the property of the Owner.

.4 Work includes the careful removal, in a manner to prevent damage, of the existing crab winches and stoplogs during staged construction. Crab winches and track segments must be left in place for staged operation of the structure during construction and demolition. Crab winches are to be reinstalled on new rails for temporary operation of the new dam by the dam operators.

.5 Work includes the manufacturing and delivery of new timber stoplogs, steel half stop-logs and log-pinning mechanisms.

.6 Work includes the construction of a gravel parking area.

.7 Work includes off-site disposal of material.

.8 Work includes the construction of temporary cofferdams to enable dewatering of the site. The design and installation of the cofferdams is solely the responsibility of the Contractor. The cofferdam shall be designed for, at minimum, the 20 year return flood for the period of construction. The Contractor is responsible for the control of water flow in the work area; disposal of excess water shall be in accordance with existing regulations and any required permits.

.9 Work includes the provision and installation of all additional dam appurtenances shown on the contract drawings including but not limited to:
- .1 Additional signage and life rings/throw lines;
- .2 Handrails and fencing;
- .3 Fall arrest system;
- .4 Vehicle guiderails;
- .5 Bollards;
- .6 Davit crane and recessed sockets;
- .7 Stairs ramps and pathways;

.10 Work includes the installation and maintenance of all environmental protection measures as well as monitoring for the effectiveness of environmental protection measures.

.11 Work shall include provision of all machinery, tools, vehicles, or other equipment required to perform the work.

.12 Work shall include provision of all labour, skilled trades, supervision staff, divers, health and safety staff, sub-trades and other staff required to perform the work.

.13 Work shall include provisions to carry out all required permits applications and associated fees in order to complete the works.

.14 Work shall include the removal and/or replacement of components of the existing data collection, storage and transmission system as described on the drawings.

.15 At the completion of the work, the site is to be restored to original site conditions unless indicated otherwise in drawings and specifications.

.16 Work shall include the provision of all surveying services required to ensure accurate lines and levels and shall also include the installation of new geodesic benchmarks on the completed dam.

1.3 CONTRACT METHOD

.1 Lump sum and unit prices contract

.2 Submit list of subcontractors.

1.4 WORK SEQUENCE

.1 Construct Work in stages to accommodate the flow of water through at least one sluice over the construction period.

.2 Construct Work in stages to minimize the need for a road closure.

.3 Coordinate Work Schedule with Departmental Representatives.

.4 Perform Work in a manner to maintain access routes and other operational and safety requirements for the Owner and Departmental Representative.

.5 Horseshoe Lake Road may be closed as part of the staged demolition and construction. Refer to Section 01 14 00 and the staging drawings for details of work restrictions. The road must be opened to at least one lane of traffic no later than the date specified for such in Section 01 14 00 –Work Restrictions.

.6 Three sluices in the Horseshoe Lake Dam must be operational by no later than the date specified for such in Section 01 14 00 –Work Restrictions.

1.5 CONTRACTOR USE OF PREMISES

.1 Limit use of premises to the work of this project, including storage in designated areas and site access.

.2 Allow for Owner and Departmental Representatives access.

.3 Coordinate use of premises under direction of the Departmental Representative.

.4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.5 Prevent injury or damage to all existing items or property which is not part of the work.

.6 Repair or replace existing items or property which is not part of the work that are altered during construction operations to match existing or adjoining work.

.7 At completion of operations, the condition of existing items or property which are not part of the work to be equal to or better than before new work started.

1.6 OWNER OPERATION OF DAM

.1 Owner will occupy premises during entire construction period for execution of normal dam operations.

.2 Provide access for Owner Representatives to operate the dam.

.3 Cooperate with Departmental Representative in scheduling operations to minimize conflict and to facilitate ongoing usage.

1.7 ALTERATIONS TO EXISTING SITE

.1 Execute work with least possible interference or disturbance to property, operations and normal use of premises by the Owner and the Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 ACCESS AND EGRESS

.1 Before bidding, the Contractor shall fully familiarize himself with access to the site of the proposed work, and shall fully inform himself of the existing conditions and limitations.

.2 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Where security is reduced by work provide temporary means to maintain security.

.3 Contractor is responsible to provide sanitary facilities for use by Contractor’s personnel and to keep facilities clean.

.4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING SERVICES

.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions at minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for personnel, and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00.

1.4 SPECIAL REQUIREMENTS

.1 The restriction window for in-water work is October 1 to July 15. Refer to attached impact analysis for details of the restriction window and required mitigations.

.2 Where possible, site clearing/commencement of construction should be planned to occur outside of sensitive bird nesting times - April 8th to August 28th.

If this is not feasible, then the site must be inspected by a biologist prior to clearing, to identify any potential for nests.

.3 Water levels can vary beyond the control of Parks Canada. However normal levels are as follows:

.1 During the navigation season, the normal headwater level is 306.34 m.

.2 During the non-navigation season, the normal headwater level is 306.17 m.

.3 The normal tailwater level is 305.12 m.

.4 Historical minimums, maximums, averages and daily levels for this year can be found at: http://www.pc.gc.ca/lhn-nhs/on/trentsevern/visit/ne-wl/trent_e.asp

.4 Carry out noise generating Work Monday to Friday from 07:00 to 20:00 hours.

.5 Submit schedule in accordance with Section 01 32 16.07.

.6 Dam removal and related in-water works to be scheduled in accordance with the construction window outlined in Section 01 32 16.07.

.7 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.8 Keep within limits of work and avenues of ingress and egress.

.9 Subsurface utility protection (gas and water mains):

.1 The use of weighted and heavy equipment loads to be distributed and bridge over subsurface utilities to prevent load impact on subsurface utilities.

.10 Hydro and Bell overhead wires to be protected.

.11 Horseshoe Lake Road may need to be closed as part of the staged demolition and construction.

.1 Contractor to post advanced notice road sign boards within 2 weeks of contract award.

.2 Sign boards are to provide minimum 14 days of notice of road closure

.3 Reopen to at least one lane of traffic no later than December 19 2016.

.4 Contractor is responsible for any detour route planning related to traffic restrictions beyond December 19 2016.

.5 All plans for said traffic restrictions and detour routes must be submitted a minimum of 14 days in advance for approval.

.12 Two sluices in the Horseshoe Lake Dam must be operational by no later than February 17 2017

1.5 SECURITY

.1 Contractor to provide means to maintain security as required by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 This section covers the measurement of work for payment purposes, and the scope of work included in the pay items in the Lump Sum and Unit Price Tables.

1.2 APPLICATIONS FOR PROGRESS PAYMENT

.1 Make applications for payment on account as provided in Agreement as work progresses.

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

.3 Submit to Departmental Representative, at least fourteen (14) days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Amount, so as to facilitate evaluation of applications for payment.

1.3 SCHEDULE OF VALUES

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

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

.3 Support claims for products delivered to place of work but not yet incorporated into work by such evidence as Departmental Representative may reasonably require to establish value and delivery of products.

1.4 PREPARING SCHEDULE OF UNIT PRICE TABLE ITEMS

.1 Submit separate schedule of unit price items of work requested in Bid and Acceptance Form.

.2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:

- .1 Cost of material.
- .2 Delivery and unloading at site.
- .3 Sales taxes.
- .4 Installation, overhead and profit.

.3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.5 MEASUREMENT AND PAYMENT PROCEDURES

.1 Lump Sum Price Item No.1 "General Site Work" - All work that is not specifically designated in the Lump Sum or Unit Price Tables as individual items but is indicated in the tender package in order to complete the Work in full, shall be paid under the Lump Sum Price item "General Site Work". This item includes all costs associated to perform the work including but not limited to material, equipment, personnel, travel and accommodations, overhead, etc. Items included in the Lump Sum Price are:

- .1 Mobilization;
- .2 Demobilization;
- .3 Designing, installing and maintaining all temporary access routes required to access the work areas;
- .4 Excavation, trenching and backfilling;
- .5 Clearing and grubbing;
- .6 Providing construction fence and perimeter security measures around work and staging areas;
- .7 Reptile exclusion fencing;
- .8 Supplying, installing and maintaining luminated/non luminated signals;
- .9 Maintaining the work/storage area for the duration of the work;
- .10 Removal of the temporary access routes;
- .11 Health and safety;
- .12 Environmental Procedures, including control work to provide effective environmental, waterbody, and fish habitat protection;
- .13 Progressive and final site cleaning including snow removal;
- .14 Dewatering system;
- .15 Roadway embankment;
- .16 Parking area landscaping;
- .17 Bollards;
- .18 Geodesic monuments;
- .19 Surveying services.

.2 The following Item titles, units and their respective associated sections list work included in each item. Further description of the work can be found in the sections referenced.

.3 Lump Sum Item No.2 – Traffic Control for Temporary Roadway Closure

- .1 This item includes all costs related to the requirements of the Owner, municipality, county and MTO for the roadway closure.
- .2 This item includes all costs related to the supply, delivery and installation of all required signage, barriers, and other temporary materials as described in the Traffic Control Plan and/or required by the Owner, municipality, county and MTO.

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.4 Lump Sum Item No.3 – Dewatering Works

.1 This item includes all costs related to:

.1 The installation and removal of upstream and downstream cofferdams, including moving the cofferdams if required to enable staged demolition, construction and operation of the dam.

.2 Installation, monitoring, operation, and removal of pumps, as required to maintain dewatered work area.

.3 Sediment control measures

.4 Straw bale filtration dam

.5 All other works required to maintain dewatered work areas.

.5 Lump Sum Item No.4 – Removal of All Existing Signage and Railings at the Site for Salvage and Reuse by PCA

.1 This item includes all costs related to the careful removal, in a manner to prevent damage and in accordance with the project plans, of all existing signage and railings.

.6 Lump Sum Item No.5 – Careful Transferal of Existing Crab Winches During Staged Construction

.1 This item includes all costs related to the careful transferal, in a manner to prevent damage, of the existing crab winches so as to enable continuous operation of the dam by the Owner.

.7 Lump Sum Item No.6 – Removal and/or Replacement of Components of the Existing Data Collection, Storage and Transmission System, including all costs related to:

.1 The removal of existing level gauge G1 and hand over to PCA for disposal.

.2 The removal of existing flow gauge G2 and protection for reinstallation.

.3 The removal of the existing gauge G3 and hand over to PCA for disposal.

.4 The installation of a new data computer and level gauge combined unit G1. Unit will be provided by PCA. Include all required conduit

.5 The installation of new gauge G2. Install intake line extending to pool and anchor end to bedrock when dewatering. Include all required conduit.

.6 The installation of new telephone cable conduit to the utility pole near Bethel Rd Bridge.

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.8 Lump Sum Item No.7 – Site Restoration at the Completion of the Work

.1 This item includes all costs related to the restoration of the site to original site conditions, unless indicated otherwise in the project drawings and specifications.

.2 This item includes all costs related to hydraulic seeding, topsoil placement, and any other works required to restore the site to original site conditions.

.9 Lump Sum Item No.8 – Manufacture, Deliver and Install Railings and Gates

.1 This item includes all costs related to the manufacture in accordance to PCA standards, delivery and installation of all railings and gates shown on the project plans.

.10 Lump Sum Item No.9 – Manufacture, Deliver and Install Stairway

.1 This item includes all costs related to manufacture, delivery and installation of the stairway.

.11 Lump Sum Item No.10 – Move PCA Safety Boom

.1 The existing PCA standard safety boom is to be maintained at the site.

.2 This item includes all costs related to the detachment of the safety boom from the existing west anchor and the removal of the existing west anchor.

.3 This item includes all costs related to the construction of a new anchor on the west bank.

.4 This item includes all costs related to the attachment of the safety boom to the new west anchor.

.12 Lump Sum Item No.11 – Supply and Install Fall Arrest System

.1 This item includes all costs related to the supply and installation of a complete fall arrest system, including all components detailed in the project plans and specifications.

.2 This item also includes all costs related to the supply of 4 retractable lanyards. Acceptable products include Protecta or DBI SALA

.13 Lump Sum Item No.12 – Supply and Install Dam Signage

.1 This item includes all costs related to the supply and installation of additional PCA standard signage and lifesaving equipment

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

including as detailed in the project plans and specifications.

.2 This item includes all costs related to the installation of previously removed signage designated for reuse including all new components required for installation as detailed in the project plans and specifications.

.14 Unit Price Item No.1 - Concrete Removal

.1 Item No.1 shall be paid at the contract unit price by the unit cubic meter. This item includes all costs related to removal of the existing concrete dam including west access wingwall, concrete deck, abutments, and concrete piers above the existing dam sill. This item also includes all costs related to removal of the sill to partial depth directed by Departmental Representative as described in Section 02 41 16 and 02 41 21. This item includes all costs related to transport and disposal of waste material off site. Item No.2 - Reinforcing Steel.

.15 Unit Price Item No.2 - Reinforcing Steel

.1 Item No.2 shall be paid at the contract unit price by the unit kilogram (kg). This item shall include all costs related to the work described in Section 03 20 00. Mass of reinforcing steel shall be computed from the theoretical unit mass specified in CAN/CSA-G30.18 for lengths and sizes of bars as indicated on drawings or authorized in writing by Departmental Representative.

.16 Unit Price Item No.3 – Cast-in-Place Concrete.

.1 Item No.3 shall be paid at the contract unit price by the unit CUBIC meter calculated from neat dimensions indicated. This item shall include all costs related to the work described in Section 03 30 00; to supply, place and finish concrete in the construction of the:

.1 Sill slab,
.2 Piers,
.3 West abutment,
.4 West cut-off wall,
.5 West wingwall,
.6 East abutment,
.7 East cut-off wall,
.8 Deck of the dam,
.9 West approach slab, and
.10 East approach slab

.2 No deductions will be made for volume of concrete displaced by reinforcing steel.

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.3 Include in the prices of concrete the bonding agent.
.4 Include in the prices of concrete the installation of all items embedded therein.
.5 Include in the prices of concrete the work described in Section 03 10 00.
.6 Include in the prices of concrete the heating, cooling, hot and cold weather protection, curing, and finishing.
.7 Include in the prices of concrete the supply and installation of joint filler, bond breaker and joint sealer.
.8 Do not include in the prices of concrete any costs related to reinforcing steel which is to be measured separately for payment.

.17 Unit Price Item No.4 – Non-Shrink Non-Metallic Grout.
.1 Item No.4 shall be paid at the contract unit price by the unit CUBIC meter calculated from neat dimensions indicated. This item shall include all costs related to the work described in Section 03 30 00; to supply and place non-shrink non-metallic grout in the gain and sill embedments, drilled holed for rock dowels and under all metal plates.

.18 Unit Price Item No.5 – Mass Fill Concrete.
.1 Item No.5 shall be paid at the contract unit price by the unit CUBIC meter calculated from field measured dimensions authorized in writing by the Departmental Representative. This item shall include all costs related to the work described in Section 03 30 00; to supply and place cast-in-place concrete in 'fill concrete under sill slab'.

.19 Unit Price Item No.6 – U-Fill Concrete
.1 Item No.6 shall be paid at the contract unit price by the unit CUBIC meter calculated from neat dimensions indicated. This item shall include all costs related to the work described in Section 03 30 00; to supply and place U-Fill concrete in the east abutment.

.20 Unit Price Item No.7 - Anchors Type A.
.1 Item No.7 shall be paid at the contract unit price per linear meter of anchor installed for all anchors indicated on drawings and any additional anchors requested by Departmental Representative. This item shall include all costs related to the work described in Section 05 05 20 related to supplying and installation of Type A anchors (rock anchors).

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.21 Unit Price Item No.8 – Silt Fencing

.1 Shall be paid at the contract unit price per linear meter. This includes all costs related to any silt fencing included in the Contractor`s environmental controls plan approved by the Departmental Representative and any additional silt fencing requested by the Departmental Representative as the work progresses.

.22 Unit Price Item No.9 – Turbidity Curtains

.1 Shall be paid at the contract unit price per linear meter. This includes all costs related to any floating silt or turbidity curtains included in the Contractor`s environmental controls plan approved by the Departmental Representative and any additional curtains requested by the Departmental Representative as the work progresses.

.23 Unit Price Item No. 10 - Manufacture and Deliver – New Steel Half Stoplogs

.1 Shall be paid at the contract unit price per steel half stoplog. This item includes all costs related to manufacturing of steel half stoplogs to PCA standards and delivery to site of steel half stoplogs.

.24 Unit Price Item No. 11 - Manufacture and Deliver – Log-Pinning Mechanisms

.1 Shall be paid at the contract unit price per log pinning mechanism. This item includes all costs related to manufacturing and delivery to site of log-pinning mechanisms.

.25 Lump Sum Item No.12 – Manufacture and Deliver – New Timber Stoplogs

.1 This item includes all costs related to manufacturing of 6 timber stoplogs, including lifting hardware, to PCA standards.

.2 This item includes all costs related to the delivery to site of 6 timber stoplogs as well as removal and delivery to PCA shop of 6 old timber stoplogs.

.26 Unit Price Item No. 13 - Backfill Material

.1 Shall be paid at the contract unit price per cubic meter. This item includes all costs related to the supply and installation of backfill materials.

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.27 Unit Price Item No. 14 - Granular A Fill Material

.1 Shall be paid at the contract unit price per cubic meter. This item includes all costs related to the supply and installation of Granular A.

.28 Unit Price Item No. 15 - Granular B Fill Material

.1 Shall be paid at the contract unit price per cubic meter. This item includes all costs related to the supply and installation of Granular B.

.29 Unit Price Item No. 16 – Clean Stone

.1 Shall be paid at the contract unit price per cubic meter. This item includes all costs related to the supply and installation of Clean Stone.

.30 Unit Price Item No. 17 - Drains

.1 Shall be paid at the contract unit price per linear meter. This item includes all costs related to the supply and installation of drains as detailed in the project drawings and specifications, including the geotextile.

.31 Unit Price Item No. 18 - Stoplog Sills

.1 Shall be paid at the contract unit price per embedded sill. This item includes all costs related to the supply and installation of the embedded stoplog sill plates as detailed in the project drawings and specifications.

.32 Unit Price Item No. 19 – Main Stoplog Gain Liners

.1 Shall be paid at the contract unit price per embedded sill. This item includes all costs related to the supply and installation of the embedded stoplog gains, including the gain liners and the angles and sheer studs edging the stoplog gains, as detailed in the project drawings and specifications.

.33 Unit Price Item No. 20 - Aluminium Stoplog Gain Covers

.1 Shall be paid at the contract unit price per complete gain cover. This item includes all costs related to the supply and installation of the stoplog gain covers.

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.34 Unit Price Item No. 21 - Davit

.1 Shall be paid at the contract unit price per davit. This item includes all costs related to the supply and delivery of the davit.

.35 Unit Price Item No. 22 - Embedded Davit Socket

.1 Shall be paid at the contract unit price per davit socket. This item includes all costs related to the supply and installation of the davit sockets, including all embedded parts.

.36 Unit Price Item No. 23 - Steel Plate Storage Box

.1 Shall be paid at the contract unit price per storage box. This item includes all costs related to the supply and installation of the steel plate storage box.

.37 Unit Price Item No. 24 - ASCE 60 lb Rails

.1 Shall be paid at the contract unit price per linear meter. This item includes all costs related to the supply and installation of the rails.

.38 Unit Price Item No. 25 - Jacking Pins

.1 Shall be paid at the contract unit price per set of two jacking pins. This item includes all costs related to the supply and installation of the jacking pins.

.39 Unit Price Item No. 26 - Coir Mat

.1 Shall be paid at the contract unit price per square meter. This item includes all costs related to the supply and installation of the coir mat.

.40 Unit Price Item No. 27 Steel Pier Nosing and Service Gain Liners

.1 Shall be paid at the contract unit price per pier. This item includes all costs related to the supply and installation of the steel pier nosing as described in the project drawings and specifications, including the embedded plate and the Nelson studs, as well as the service gain liners.

1.5 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.41 Unit Price Item No. 28 Half Steel Pier Nosing and Service Gain Liners

.1 Shall be paid at the contract unit price per pier. This item includes all costs related to the supply and installation of the half steel pier nosing as described in the project drawings and specifications, including the embedded plate and the Nelson studs, as well as the service gain liners.

.42 Unit Price Item No. 29 - Rip Rap

.1 Shall be paid at the contract unit price per cubic meter, measured on site. This item includes all costs related to the supply and installation of rip rap.

.43 Unit Price Item No. 30 - Geotextile

.1 Shall be paid at the contract unit price per square meter. This item includes all costs related to the supply and installation of geotextile.

.44 Unit Price Item No. 31 - Log Rests

.1 Shall be paid at the contract unit price per set of two log rests. This item includes all costs related to the manufacturing, delivery and installation of the log rests.

.45 Unit Price Item No. 32 – Modular Block Wall

.1 Shall be paid at the contract unit price per square meter of vertical wall face. This item includes all costs related to the supply and installation of the block wall.

.46 Unit Price Item No. 33 – Aggregate Wall Infill

.1 Shall be paid at the contract unit price per cubic meter. This item includes all costs related to the supply and installation of aggregate wall infill.

1.6 PROGRESS PAYMENT

.1 Departmental Representative will issue to Owner, no later than Ten (10) days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Departmental Representative determines to be properly due. If Departmental Representative amends application, Departmental Representative will give notification in writing giving reasons for amendment.

1.7SUBSTANTIAL PERFORMANCE OF WORK

.1 Prepare and submit to Departmental Representative a comprehensive list of items to be completed or corrected and apply for a review by Departmental Representative to establish Substantial Performance of Work or Substantial Performance of designated portion of Work when Work is substantially performed if permitted by lien legislation applicable to Place of Work designated portion thereof which Departmental Representative agrees to accept separately is substantially performed. Failure to include an item on list does not alter responsibility to complete the Contract.

.2 Submit an application for final payment when work is completed.

.3 Departmental Representative will, no later than ten (10) days after receipt of an application for final payment, review work to verify validity of application. Departmental Representative will give notification that application is valid or give reasons why it is not valid, no later than seven (7) days after reviewing work.

.4 Departmental Representative will issue a Certificate of Completion and a Certificate of Measurement when application for final payment is found valid.

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of the 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, affected parties not in attendance and Departmental Representative.

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

1.2 PRECONSTRUCTION MEETING

.1 Within ten (10) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum ten days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:
.1 Appointment of official representative of participants in the Work.
.2 Health and Safety Plan
.3 Environmental Issues and Mitigation Measures
.4 Schedule of Work: in accordance with Section 01 32 16.07.

.5 Submittal Schedule: Submit submittals in accordance with Section 01 33 00.
.6 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
.7 Site security in accordance with Departmental Representative requirements.
.8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.9 Monthly progress claims, administrative procedures, photographs, hold backs.
.10 Appointment of inspection and testing agencies or firms.
.11 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and two weeks prior to project completion, schedule progress meetings bi-weekly.

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

.3 Notify parties minimum five days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three days after meeting.

.5 Agenda to include the following:
.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Corrective measures and procedures to regain projected schedule.
.6 Revision to construction schedule.
.7 Progress schedule, during succeeding work period.
.8 Review submittal schedules: expedite as required.
.9 Maintenance of quality standards.
.10 Review proposed changes which affect construction schedule and completion date.
.11 Other business.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

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

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

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

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Specified Contract completion date is April 2017.

.2 The construction window for dam demolition and removal is dependent on fish migration and spawning periods. Refer to Section 01 14 00 –Work Restrictions, for the restriction window to in-water works. The Contractor is responsible for implementing required mitigations as outlined in the attached impact analysis.

.3 Where possible, site clearing/commencement of construction should be planned to occur outside of sensitive bird nesting times; see Section 01 14 00 –Work Restrictions. If this is not feasible, then the site must be inspected by a biologist prior to clearing, to identify any potential for nests.

.4 The contractor shall make every effort to minimize time working in the streams or water body. Accordingly all necessary materials and equipment should be on site before proceeding with removal such that delays waiting for materials or equipment do not occur once in-stream activities have commenced.

.5 Ensure Project Schedule is practical and remains within specified Contract duration.

.6 Detail Project Schedule to include a breakdown of work activity.

.7 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

.8 Submit Project Schedule to Departmental Representative for comment and update accordingly.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit to Departmental Representative within 5 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 five working days of receipt of acceptance of Master Plan.

1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning,

organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within five working days.

.3 Revise impractical schedule and resubmit within five working days. Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan and specified contract duration.

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

.1 Award.
.2 Permits.
.3 Mobilization
.4 Roadway closure.
.5 Roadway reopening.
.6 Installation of environmental controls.
.7 Dewatering sequence.
.8 Construction staging sequence.
.9 Demolish right wingwalls/access and right pier.
.10 Construct retaining wall, wingwall and parking area.
.11 Demolish right side of dam.
.12 Construct right side of dam.
.13 Demolish left side of dam.
.14 Construct left side of dam.
.15 Installation of operating and safety equipment.
.16 Installation of railings and signage.
.17 Site remediation and landscaping.
.18 Demobilization.
.19 Contract Closeout.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation. Contractor to resubmit updated Project Schedule to Departmental Representative for review in case of delays due to severe weather conditions.

1.7 PROJECT

.1 Discuss Project Schedule at regular site meetings,

MEETINGS

identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

Not used.

1.2 REFERENCES

Not used.

1.3 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.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Submissions include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

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

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

.2 After Departmental Representative's review, distribute copies.

.3 Submit electronic copy] of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.4 Submit electronic 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.

.5 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to

material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.6 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.7 Submit electronic copies of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.8 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.9 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.10 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.11 Delete information not applicable to project.

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

.13 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.

.14 The review of shop drawings by Parks Canada Agency and its representatives (PCA) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PCA 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.

1.5 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's site office.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative] [DCC Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 MOCK-UPS

Not used.

1.7 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 4 locations.

.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: monthly or as directed by Departmental Representative,

.2 Upon completion of: excavation, foundation, framing and services before concealment, of Work.

1.8 CERTIFICATES AND TRANSCRIPTS

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

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

PART 2- PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 – GENERAL

1.1 REFERENCES

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

.2 Canadian Standards Association (CSA).
.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.3 National Building Code (NBC) 2015.
.1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.4 National Fire Code (NFC) 2015.
.1 NFC 2010, Division B, Part 2, Emergency Planning, subsection 2.8.2 Fire Safety Plan.

.5 Province of Ontario
.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2005.
.2 Forest Fires Prevention Act of Ontario 1990, Chapter 24.
.3 Workplace Safety and Insurance Act, 1997.
.4 Municipal Statutes and authorities.

.6 Treasury Board of Canada Secretariat (TBS):
.1 Treasury Board, Fire Protection Standard April 1, 2010. www.tbs-sct.gc.ca/pol/doc-eng.aspx ?id=17316&section=text.

1.2 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. Use Parks Canada Safety Template. Form attached as appendix item.

.3 Submit 3 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 in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 01 – Hazardous Materials.

.7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant 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 Consultant.

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

.11 Complete and Submit Parks Canada Attestation and Proof of Compliance with Occupational Health and Safety. Form attached as appendix item.

1.3 FILING OF NOTICE

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

.2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location. Contractor shall provide a written acknowledgement of this responsibility with 1 week of contract award, or prior to beginning work, whichever is sooner.

.3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.4 SAFETY ASSESSMENT

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

1.5 WORK PERMIT

.1 Obtain road permits related to project prior to commencement of Work.

.2 Obtain all other permits related to the project, as required, such as well decommissioning, prior to commencement of the work.

1.6 MEETINGS

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

1.7 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00.

.2 Comply with the Acts and Regulations of the Province of Ontario and Canada.

.3 Comply with specified standards and regulations to ensure safe operations at site.

1.8 PROJECT/SITE CONDITIONS

.1 The following are known or potential project related health, environmental and safety hazards at site which must be properly managed if encountered during course of work:

.1 Work adjacent to streams and water.
.2 Working within and adjacent to roadway.
.3 Working in a remote location.
.4 Upstream leakage between stoplogs creating strong drawing force.
.5 Rapidly changing flows and water levels below a dam.
.6 Steep embankments and retaining walls may impede quick egress from dangers.
.7 Slippery conditions due to ice formation during winter months in and around dams.
.8 Unprotected gain openings on the dam present a fall hazard.
.9 Hazards related to working in a remote and natural area including insect, vegetation and wildlife related hazards.
.10 Possible tripping hazards include tracks, anchor points, and gain covers.
.11 Slipping hazard on upstream and downstream side of earth embankments due to steep slopes, uneven or loose soil and rocks.
.12 Above list shall not be construed as being complete and inclusive of potential health, and safety hazards encountered during work. Include above items into hazard assessment process.

.2 For work in isolated locations Contractor to comply with Occupational Health and Safety Act, S.25 (2)(h)-Duties of employers and other applicable regulations.

.3 For working near, on or above a body of water Contractor to comply with Safe Boating Guide issued by Transport Canada, OHS Regulation 213/91 – Section 27, CAN/CGSB-65.7 for use of life jackets and CAN/CGSB-65.11 for use of Personal Flotation Devices (PFDs)

.4 Provide traffic control measures when working on, or adjacent to, roadways in accordance with the “Traffic Control Manual for Roadwork Operations”, Department of Transportation and Works.

.5 Erect safety barricades, lights and signage on site to effectively delineate work areas, protect pedestrian and vehicular traffic around and adjacent to work and to create a safe working environment.

.6 Contractor to comply with Municipal Bylaws and Owner's bylaws for the use of ATV's and side-by-side off-road vehicle on site.

.7 For Forest Safety Worker's to show valid certificates on training in First Aid, Forest Safety, Forest Survival, Heat/Cold Stress and use of an auto-injector (EpiPen) and to comply with Occupational Health and Safety Act (OHSA).

.8 For helicopter use, contractor to comply with applicable regulations.

.9 For Thermal Exposure – Heat/Cold stress Contractor to comply with OHS Regulation 213/91 and other applicable regulations.

.10 Work of this nature may involve:

.1 Contact with silica in concrete, concrete block and ceramic tile.

.2 Contact with mercury in switches, lights and thermostats.

.3 Contact with asbestos in pipe covering, wall shingles, gypsum board, joint compound, asphalt shingles, roof and wall felt paper.

.4 Contact with lead in paint, solder.

.5 Contact with coal, cinders, ash, nylon debris, copper, beryllium, nickel, molybdenum and PAH impacted soils.

.6 Contact with PCBs in ballasts.

.7 Contact with benzene, arsenic and acrylonitrile in paints, and adhesives.

1.9 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 either accepting requesting improvements.

.3 Relief from or substitution for any portion or provision of minimum Health and Safety Standards specified herein or reviewed site-specific. Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.10 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 Contractor will be responsible and shall be designated "Constructor" as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

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

1.11 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in accordance with Acts and Regulations of Province of Ontario and advise Departmental Representative verbally and in writing.

1.12 HEALTH AND SAFETY COORDINATOR

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

.1 Have site-related working experience specific to activities associated with abatement of lead and asbestos containing material and contaminated soil.

.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 site supervisor.

1.13 POSTING OF DOCUMENTS

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

.1 Contractor's Safety Policy.

.2 Contractor's name.

.3 Notice of project.

.4 Name, trade and employer of Health and Safety Representative or Joint Health and Safety committee

member.
.5 Ministry of Labour orders and reports.
.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
.7 Address and phone number of nearest Ministry of Labour office.
.8 Material Safety Data Sheets.
.9 Written emergency response plan.
.10 Site-specific safety plan.
.11 Valid certificate of on-duty First Aider.
.12 WSIB "In Case of Injury at Work" poster.
.13 Location of toilet and clean-up facility.

1.14 CORRECTION OF NON-COMPLIANCE

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

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

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

1.15 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.16 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 Assign responsibility and obligation to Health and Safety coordinator and/or competent supervisor to stop or start Work when, at Health and Safety Coordinator and/or competent supervisor's discretion, it is necessary or advisable for reasons of health and safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 11 – Cleaning.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.2 DEFINITIONS

.1 Environmental Pollution and Damage:

.1 Presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection:

.1 Prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, air; biological and cultural resources and includes management of visual aesthetics; noise; solid, chemical, gaseous and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.1 Include a list of key project activities and identify the actual and potential environmental impacts associated with each activity.

.3 Environmental Protection Plan (EPP) must include comprehensive overview of known or potential environmental issues to be addressed during construction. EPP must show consideration of spring freshet conditions in the event that project timing slips into this period. EPP must demonstrate that this condition is planned for and work activities will be halted or revised accordingly. The potential environmental issues associated with the construction activities include, but are not limited to, the following:

.1 Introduction of fines or silt to waterways – during placement of rock fill; rock excavation; cofferdam construction; dewatering; construction of new dam; demolition of existing dam; coffer dam removals; commissioning of new dam
.2 Contamination of waterways due to spills – during refueling; a hydraulic line rupture; an accidental spill of lubricants

.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 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
.3 Names and qualifications of persons responsible for training site personnel.
.4 Descriptions of environmental protection personnel training program.
.5 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, Federal, Provincial, and Municipal laws and regulations. The plan will describe water quality standards to be adhered to and frequency of monitoring on-site.
.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
.7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
.8 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
.9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
.10 Air pollution control plan detailing

provisions to assure that dust, debris, materials, and trash, are contained on project site.

.11 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.

.12 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. Note that if wastewater has a pH greater than or equal to 12.t it is considered a hazardous waste under Ontario Regulation 347. The contractor would be responsible for proper disposal.

.13 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.14 Plan to include provisions for protecting species at risk (SAR), including procedures for reporting if SAR found in the project area and measures for keeping at risk turtles out of the project site (including, but not necessarily limited to, installation of reptile exclusion fencing around disturbed soils and stockpiles). Should any suspected SAR be encountered, or if there is potential to negatively impact SAR (or wildlife generally), contact PCA EA staff (705) 750-4931 for guidelines on how to proceed

1.4 DISPOSAL AND WASTES

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.5 DRAINAGE

.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, Federal,

Provincial, and Municipal laws and regulations.

.2 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .1 Water with harmful substances to be disposed in accordance with local authority, provincial and federal regulatory requirements.

.3 Ensure pumped water into waterways or drainage systems is free of suspended materials.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority, provincial, and federal requirements.

.5 The following factors must be considered in determining the suitability of specific erosion control practices:
- .1 Run-off Quantity and Velocity: Dictates the suitability of products;
- .2 Soil Characteristics: Soil texture and chemistry can affect the performance of many erosion control practices. Grain size characteristics of concrete sediment must be considered when selecting filter fabric material. Filter fabric material shall be designed around the principles of maintaining sufficient hydraulic flow and preventing particle movement through the material;
- .3 Topography: The selection and success of erosion control practices is dependent on slope length and gradient. The ease or difficulty of diverting clean run-off around the site is dependent on the terrain and drainage patterns;
- .4 Climate and Season
  Contingency measures for extreme water events including rainfall and flooding need to be considered in the Plan.
- .5 Temporary vs. Permanent Controls: Some erosion control practices are intended as permanent measures;
- .6 Accessibility: Some practices require access for specialized equipment (i.e. hydro-seeding);
- .7 Erosion and sediment control requirements by construction phase

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated on approved site/work plans.

.2 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.3 Minimize stripping of topsoil and vegetation. Restrict grubbing and clearing to locations previously identified in construction site plans.

.4 Restrict tree removal in areas of work and as designated by Departmental Representative. Tree removal to be restricted to locations previously identified in construction site plans.

.5 Do not cut new trails to complete work.

1.7 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material and debris in waterways.

.4 Do not skid logs or construction materials across waterways.

.5 Any stockpiled materials shall be removed from site, or stored and stabilized a safe distance away from any watercourse, drainage course, or swales to prevent erosion and subsequent entry into the water body.

1.8 IN WATER WORK

.1 In water work includes the construction of temporary cofferdams, and the removal of existing structures. Site locations and demolition details are provided in contract drawings.

.2 All in water work must occur within the construction timing windows outlined in Section 01 32 16.07.

.3 All work must comply with the Fisheries Act, as regulated by the Department of Fisheries and Oceans.

.4 In-water work must comply with the Ministry of

Natural Resources and Forestry in-water timing windows.

.5 The contractor shall make every effort to minimize time working in the streams or water body. Accordingly, all necessary materials and equipment should be on site before proceeding with removal such that delays waiting for materials or equipment do not occur once in-stream activities have commenced.

.6 In water work shall be performed in a manner that minimizes the disturbance of the watercourse bottom and dispersion of sediment.

.7 Work should occur in the dry using appropriate dewatering procedures for the site. Dewatering procedures to be set out in EMP/EPP as applicable and approved by Parks Canada.

.8 Fish and wildlife stranded within the work area, particularly de-watered areas, shall be captured and released live in suitable habitat on the same side of the work area from which they were captured, and under the supervision of a qualified aquatic biologist.

.9 A qualified biologist should be on site during decommissioning and demolition work.

.10 No acid-bearing (containing sulphides) rock shall be used for in water works.

1.9 POLLUTION CONTROL

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

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

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area by providing temporary enclosures.

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

.5 Spills of deleterious substances:

.1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements and to the satisfaction of the

Departmental Representative. Documentation of remediation, testing and results must be provided to the Departmental Representative.

.2 Report immediately to Ontario Spills Action Centre: 1-800-268-6060 and the Departmental Representative.

.3 Further information on dangerous goods emergency clean-up and precautions including a list of companies performing this work can be obtained from Transport Canada 24 hr. collect number 613-996-666.

1.10 HISTORICAL/ ARCHAEOLOGICAL CONTROL

.1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.11 NOTIFICATION

.1 The Contractor shall monitor compliance with the Contractor’s environmental plan, logging compliance and non-compliance issues. The log shall be presented to the Departmental Representative for review.

.2 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.3 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

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

.4 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

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

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

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

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC), 2010, National Fire Code of Canada (NFC), 2010 and Ontario Building Code (OBC), 2012 including amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Perform work in adherence to Fisheries Act, federal and provincial Species at Risk Acts, federal and provincial Environmental Protection Acts, and Migratory Bird Act.

.3 Perform work in adherence with the restrictions listed in Section 01 14 00 –Work Restrictions.

.4 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.

.2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.

.3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

1.4 RELICS AND ANTIQUITIES

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

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 ABBREVIATIONS AND ACRONYMS

.1 The abbreviations and acronyms are commonly found in the Project Manual and represent the associated organizations or terms.

1.2 MATERIALS, EQUIPMENT AND METHODS

.1 A:
- .1 AL: aluminum.
- .2 AB: anchor bolt.
- .3 ANOD: anodized.
- .4 ARCH: architecture.

.2 B:
- .1 B: base.
- .2 BEAST: benthic assessment of sediment.
- .3 BH: bore hole.
- .4 BL: bottom layer.
- .5 BLK: block.
- .6 BLKD: bulkhead.
- .7 BM: beam.
- .8 BOT: bottom.
- .9 BMP: best management practice.
- .10 B PL: base plate.
- .11 BRG: bearing.
- .12 BTEX: benzene, toluene, ethylbenzene
- .13 BUR: built-up roof.

.3 C:
- .1 CAL: caliper.
- .2 CANTIL: cantilever.
- .3 CB: catch basin.
- .4 CC: centre to centre.
- .5 CCN: contemplated change notice.
- .6 CDF: controlled density fill.
- .7 CEC: Canadian electrical code.
- .8 CHAN: channel.
- .9 CHS: Canadian hydrographic service.
- .10 CJ: construction joint.
- .11 CL: centreline.
- .12 CLG: ceiling.
- .13 CLR: clear.
- .14 COL: column.
- .15 CONC: concrete.
- .16 CONC BLK: concrete block.
- .17 CONC BRK: concrete brick.
- .18 CONT: continuous.
- .19 CONT J: control joint.
- .20 COMPL: complete.
- .21 CM: centimetre.
- .22 CPM: critical path method.
- .23 CT: ceramic tile.
- .24 C/W: complete with.

.4 D:
- .1 D: deep.
- .2 DEG: degree.
- .3 DIA: diameter.
- .4 DIM: dimension.
- .5 DL: dead load.
- .6 DP: dampproofing.
- .7 DR: door.
- .8 DWL: dowel.

.5 E:
- .1 EA: each.
- .2 ECF: engineered containment facility.
- .3 EE: each end.
- .4 EF: each face.
- .5 EL: elevation.
- .6 ELEC: electric.
- .7 EM: expanded metal.
- .8 ENCL: enclosure.
- .9 EQ: equal.
- .10 EXH: exhaust.
- .11 EXIST: existing.
- .12 EXPJ: expansion joint.
- .13 EXP STRUCT: exposed structure.
- .14 EXT: exterior.
- .15 EW: each way.

.6 F:
- .1 FC: fuel contributed.
- .2 FDN: foundation.
- .3 FIN: finish.
- .4 FL: floor.
- .5 FLD: field.
- .6 FR: frame.
- .7 FTG: footing.

.7 G:
- .1 GALV: galvanized steel.
- .2 GC: General Conditions.
- .3 GF: ground floor.

.8 H:
- .1 HDW: hardware.
- .2 HDWD: hardwood.
- .3 HOR: horizontal.
- .4 HOR EF: horizontal each face.
- .5 HP: hydro pole.
- .6 HT: height.

.9 I:
- .1 ID: inside diameter.
- .2 INS: insulation.

.10 J:
- .1 JT: joint.

.11 L:
- .1 LG: long.
- .2 LL: live load.

.12 M:
- .1 MAS: masonry.
- .2 MAS FL: masonry flashing.
- .3 MAX: maximum.
- .4 MECH: mechanical.
- .5 MET: metal.
- .6 MET DK: metal deck.
- .7 MET FL: metal flashing.
- .8 MET GRTG: metal grating.
- .9 MH: maintenance hole.
- .10 MIN: minimum.
- .11 MO: masonry opening.
- .12 MWP: membrane waterproofing.

.13 N:
- .1 NBC: National Building Code.
- .2 NF: near face.
- .3 NFC: National Fire Code.
- .4 NIC: not in contract.
- .5 NRC: noise reduction coefficient.
- .6 NRP: non removable pin.
- .7 NTS: not to scale.

.14 O:
- .1 OBC: Ontario Building Code
- .2 OC: on centre.
- .3 OD: outside diameter.
- .4 OPNG: opening.
- .5 OPR: operator.
- .6 OVHD: overhead.
- .7 OWSJ: open web steel joist.

.15 P:
- .1 P: prefinished.
- .2 PAH: polynuclear aromatic hydrocarbons.
- .3 PARG: parging.
- .4 PCC: precast concrete.
- .5 PL: plate.
- .6 PLYWD: plywood.
- .7 PR: pair.
- .8 PREFAB: prefabricated.
- .9 PRFL: profile.
- .10 PT: preservative treated (wood).
- .11 PVC: polyvinyl chloride.

.16 R:
- .1 R: radius.
- .2 RC: reinforced concrete.
- .3 REINF: reinforced/reinforcing.
- .4 REQD: required.
- .5 REQT: requirement.

.6 RM: room.
.7 RO: rough opening.
.8 RWL: rain water leader.

.17 S:
.1 SAN SEW: sanitary sewer.
.2 SCHED: schedule.
.3 SCRN: screen.
.4 SECT: section.
.5 SL: sliding.
.6 SPEC: specification.
.7 SS: stainless steel.
.8 STD: standard.
.9 STL: steel.
.10 STL BM: steel beam.
.11 STC: sound transmission class.
.12 STL FL DK: steel floor deck.
.13 STL PL: steel plate.
.14 STN: stone.
.15 STR: structure or structural.
.16 ST SEW: storm sewer.
.17 S&U: stain and urethane.
.18 S&V: stain and varnish.

.18 T:
.1 T: top.
.2 T&B: top and bottom.
.3 TCB: turbidity control plan.
.4 TEL: telephone.
.5 THKNS: thickness.
.6 THR: threshold.
.7 TOPG: topping.
.8 TRANSV: transverse.
.9 TYP: typical.

.19 U:
.1 U: urethane.
.2 UCUT: undercut.
.3 UGRD: underground.
.4 UNO: unless noted otherwise.
.5 UOS: unless otherwise specified.
.6 U/S: underside.
.7 UR: urinal.
.8 UTM: universal transverse mercator

.20 V:
.1 VERT: vertical.
.2 VERT EF: vertical each face.

.21 W:
.1 WD: wood.
.2 WHMIS: workplace hazardous materials information system.
.3 WP: waterproofing.
.4 WSIB: workplace safety and insurance board.
.5 WT: weight.

1.3 STANDARDS ORGANIZATIONS

.1 Standards writing organizations:

.1 AA - Aluminum Association.
.2 ACPA - American Concrete Pipe Association.
.3 ANSI - American National Standards Institute.
.4 ASHRAE - American Society of Heating and Refrigerating and Air-Conditioning Engineers.
.5 ASTM - American Society for Testing and Materials.
.6 AWI/AWMAC - Architectural Woodwork Institute/Architectural Woodwork Manufacturers Association of Canada.
.7 AWPA - American Wood Preservers' Association.
.8 AWWA - American Water Works Association.
.9 BHMA - Builders Hardware Manufacturers Association.
.10 CCA - Canadian Construction Association.
.11 CCDC - Canadian Construction Documents Committee.
.12 CCMPA - Canadian Concrete Masonry Producers Association.
.13 CGSB - Canadian General Standards Board.
.14 CNTA - Canadian Nursery Trades Association.
.15 CPCA - Canadian Painting Contractors Association.
.16 CRCA - Canadian Roofing Contractors Association.
.17 CSA - Canadian Standards Association.
.18 CSC - Construction Specifications Canada.
.19 CSDMA - Canadian Steel Door Manufacturers Association.
.20 CSI - Construction Specifications Institute.
.21 CSSBI - Canadian Sheet Steel Building Institute.
.22 CRCA - Canadian Roofing Contractors Association.
.23 DHI - Door and Hardware Institute.
.24 EEMAC - Electrical and Electronic Manufacturer's Association of Canada.
.25 ESA - Electrical Safety Authority.
.26 FCC - Fire Commissioner of Canada.
.27 FSC - Forest Stewardship Council.
.28 GANA - Glass Association of North America.
.29 HMMA - Hollow Metal Manufacturers Association.
.30 IEEE - Institute of Electrical and Electronics Engineers Inc.
.31 ISO - International Organization for Standardization.
.32 IWFA - International Window Film Association.
.33 LEED - LEED Canada, Leadership in Energy and Environmental Design.
.34 MPI - Master Painters Institute.
.35 NAAMM - National Association of Architectural Metal Manufacturers.
.36 NCPI - National Clay Pipe Institute.

.37 NEMA - National Electrical Manufacturers Association.
.38 NFPA - National Fire Protection Association.
.39 OPSD - Ontario Provincial Standard Drawings.
.40 OPSS - Ontario Provincial Standard Specifications.
.41 PPI - Plasctics Pipe Institute.
.42 SDI - Steel Door Intitute.
.43 SCAQMD - South Coast Air Quality Management District.
.44 TIA - Telecommunications Industry Association.
.45 TIAC - Thermal Insulation Association of Canada.
.46 TTMAC - Terrazzo Tile and Marble Association of Canada.
.47 UL - Underwriters Laboratories.
.48 ULC - Underwriters Laboratories of Canada.
.49 US EPA - United States Environmental Protection Agency.
.50 WH - Warnock Hersey.

1.4 FEDERAL GOVERNMENT DEPARTMENTS AND AGENCIES

.1 Departments, agencies and crown corporations.
.1 CEAA - Canadian Environmental Assessment agency.
.2 CSC - Correctional Service Canada.
.3 CRA - Canada Revenue Agency.
.4 DND - Department of National Defence.
.5 EC - Environment Canada.
.6 FHBRO - Federal Heritage Buildings Review Office.
.7 HC - Health Canada.
.8 HCD - Heritage Conservation Directorate.
.9 LC - Labour Canada.
.10 PC - Parks Canada.
.11 PWGSC - Public Works and Government Services Canada.
.12 RCMP - Royal Canadian Mounted Police.
.13 TBS - Treasury Board Secretariat.
.14 TC - Transport Canada

1.5 PROVINCIAL GOVERNMENT DEPARTMENTS AND AGENCIES

.1 MOEE – Ontario Ministry of Environment and Energy.

.2 MOL - Ontario Ministry of Labour.

.3 MTO and MOT - Ontario Ministry of Transportation.

.4 MNRF – Ontario Ministry of Natural Resources and Forestry.

1.6 INTERNATIONAL GOVERNMENT DEPARTMENTS AND AGENCIES

.1 DOHMH - New York City Department of Health and Mental Hygiene, USA.

.2 GSA - Government Services Administration, USA.

1.7 UNITS OF MEASURE (METRIC)

.1 The following abbreviations of units of measure commonly found in the Project Manual:
- .1 cm: centimetre.
- .2 kg: kilogram.
- .3 kg/m^3: kilogram per cubic metre.
- .4 kN: kilonewton.
- .5 kPa: kilopascals.
- .6 kW: kilowatts.
- .7 l/s: litre per second.
- .8 m: metre.
- .9 m^3: cubic metre.
- .10 mg/kg: milligrams per kilogram.
- .11 mg/L: milligrams per litre.
- .12 mm: millimetres.
- .13 MPa: megapascal.
- .14 NTU: nephelometric turbidity unit.
- .15 ppm: parts per million.
- .16 ug/L: micrograms per litre.
- .17 ug/m^3: micrograms per cubic metre.

1.8 UNITS OF MEASURE (IMPERIAL)

.1 The following abbreviations of units of measure commonly found in the Project:
- .1 F: Fahrenheit.
- .2 ft: foot/feet.
- .3 ga: guage.
- .4 gpm: gallons per minute.
- .5 in: inches.
- .6 lbs: pounds.
- .7 NTU: nephelometric turbidity unit.
- .8 psi: pounds-force per square inch.
- .9 ppm: parts per million.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests.

1.2 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 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. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies may 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 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. Pay costs for retesting and re-inspection.

1.4 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.

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by 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. The contract price will deduct (price difference in value between Work performed and that called for by Contract Documents) amount of which will be determined by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 PRECEDENCE

.1 For Federal Government Projects, Division 01 Sections take precedence over technical specifications in other Divisions of this Project Manual.

1.2 RELATED REQUIREMENTS

.1 Section 01 35 43 : Environmental Procedures

1.3 REFERENCES

.1 Environmental Choice Program
.1 CCD-016-[97(R2005)], Thermal Insulation Materials.
.2 CCD-020-[95(R2007)], Gypsum Wallboard.
.3 CCD-029-[96], Water Conserving Products.
.4 CCD-045-[95], Sealant and Caulking Compounds.
.5 CCD-046-[95], Adhesives.
.6 CCD-047-[98(R2005)], Architectural Surface Coatings.
.7 CCD-048-[95(R2006)], Surface Coatings - Recycled Water-Borne.
.8 CCD-127-[95], Recycled Plastic Products.
.9 CCD-144-[2003], Naturally-Derived Phenol Substitutes.
.10 CCD-150-[2004], Steel for Use in Construction Products.
.11 CCD-152-[2001(R2005)], Flooring Products.
.12 CCD-167-[2007], Mosaic Tiles.

.2 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.

.3 Green Seal Environmental Standards (GS)
.1 GS-03-[97], Environmental Criteria for Anti-Corrosive Paints.
GS-11-[11], Standard for Paints and Coatings.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Submittals required:
.1 Submit name and experience of Green Design Co-ordinator to Departmental Representative for approval.
.2 Compliance Report indicating requirement to purchase energy efficient and environmentally benign products.
.3 Use Report indicating understanding of requirement to use materials and methods of construction, which improve energy and water efficiency, reduce hazardous by-products, and use recycled materials, or materials, which can be reused.

.3 Submit 2 copies of WHMIS MSDS in accordance with Section [01 35 29.06 - Health and Safety Requirements] [01 35 43 - Environmental Procedures]. Indicate VOC emissions, prior to installation or use:
.1 Adhesives.
.2 Caulking compounds.
.3 Sealants.
.4 Insulating materials.
.5 Paints.
.6 Floor and wall patching or levelling materials.
.7 Lubricants.
.8 Clear finishes for wood surfaces.

.4 Construction Schedule:
.1 Submit schedule of construction prior to start of work, in co-ordination with scheduling requirements, including:
.1 Sequence of finish applications and allowances for curing times.
.2 Identification of finish types..
.3 Delivery schedules of manufactured materials which are anticipated to off-gas in timely manner, which will allow for airing of those materials prior to their scheduled installation.

1.5 HAZARDOUS MATERIALS .1 Follow methods and procedures specified in Section 02 81 01 - Hazardous Materials.

.2 Take measures to ensure chemical spills do not enter drains.

.3 Provide proper storage and containment of herbicides and indoor pesticides.
.1 Design and construction of storage spaces for hazardous materials in accordance with authorities having jurisdiction.
.2 Include ventilation of areas, which contain potential sources of air contamination.
.1 Comply with standards for storage of flammable, combustible and hazardous materials, explosives, compressed gas cylinders, and reactive, corrosive and oxidizing materials.
.3 Storage conditions, ventilation requirements, construction materials storage areas, containers, drums and tanks, compatibility issues, and labelling: in accordance with federal and municipal guidelines supplemented as follows:

.1 Confine storage of chemicals and hazardous wastes to designated areas with security of access.

.2 Ensure access to hose bib and water for mixing concentrated chemicals.
.3 Include containment to prevent spills from entering drains.
.4 Include venting to exterior.
.5 Keep storage areas under negative pressure, where possible.

1.6 SITE MANAGEMENT

.1 Enhancing ecological value of site by maintaining the native vegetation along the waterway

1.7 EROSION AND SEDIMENTAION CONTROL

.1 Follow methods and procedures specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Establish long-term soil stabilization program as indicated.

.3 Develop an Erosion and Sedimentation Control Plan to control stormwater runoff and other erosion measures.

.4 Protect stockpiled topsoil.

1.8 REDUCING SITE DISTURBANCES

.1 When building is on a previously undeveloped site comply with following requirements:
.1 Avoid major alterations to sensitive topography, vegetation and wildlife habitat in areas indicated.
.2 Create traffic patterns, which cause minimum site disruptions, as per Departmental Representative's approval.

.2 Minimize disturbances to watershed using site water management measures to ensure that watersheds and groundwater will be preserved.

.3 Construct and erect erosion barriers to locations indicated and as directed by Departmental Representative.

.4 Take measures to avoid soil compaction.

.5 Re-grade and plant vegetation in accordance with Sections 32 91 19.13 – Topsoil Placement and Grading and 32 92 19.16 – Hydraulic Seeding.

1.9 GENERAL CONSTRUCTION MATERIALS/PRACTICES

.1 Materials and Resources
- .1 Use uncontaminated demolition materials for fill and hardcore and/or granular base.
- .2 Incorporate reused building materials as indicated.
- .3 Use products and services that meet criteria of EcoLogo guidelines.
- .4 Provide list of non-endorsed products and services, provided the green labelled product or services are capable of meeting specified performance requirements.

.2 Construction Waste Management
- .1 Follow recommendations and requirements of this projects construction, renovation and demolition (CRD) waste management plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Recycled Content
  - .1 Use materials with post-consumer and post-industrial recycled content.
- .3 Local/Regional Materials
  - .1 Use systems and materials having 10 %, by cost, of total products or materials manufactured within 800 kilometers if transported by truck or 2400 kilometers if transported by rail or water of project site.
- .4 Wood
  - .1 Use lumber sourced from independently certified well-managed forests in accordance with CAN/CSA-Z809 or FSC or SFI

1.10 PAINTS, STAINS, AND VARNISHES

.1 Use paints and coatings with VOC limits to CCD-047.

1.11 SEALANTS, ADHESIVES AND COMPOUNDS

.1 Use adhesives with VOC limits to CCD-046.

.2 Use sealant products with VOC limits to CCD-045.

1.12 EXTERIOR SITE

.1 Take measures to prevent soil erosion before, during, and after construction by controlling storm-water runoff and wind erosion. Use:
- .1 Detention ponds.
- .2 Infiltration trench.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 52 00 – Construction Facilities.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use and restore site to original conditions or better.

1.4 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.
.1 Also in accordance with Section 01 35 43.

1.5 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to facilitate progress of work and provide adequate ventilation to meet health regulations for safe working environment.

.4 Ventilating:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Ventilate temporary sanitary facilities.
.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Maintain strict supervision of operation of

temporary heating and ventilating equipment to:
.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.
.5 Vent direct-fired combustion units to outside.

.6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6 TEMPORARY POWER AND LIGHT

.1 There is no lighting or power supply on site. Provide and pay for temporary power during construction for temporary lighting and operating of power tools.

.2 Provide and maintain temporary lighting throughout project.

.3 Access to private power supply on neighboring property is prohibited without prior arrangements being made with the private owner. Pre-existing agreements for use and access of neighboring private land and facilities are in place between the private property ownership and Parks Canada. These agreements do not include access to any utilities. Any requests for use of the private owner’s property or facilities not explicitly indicated in these specifications and/or on the contract drawings must be approved first by the Departmental Representative. Do not contact the private owner directly.

.4 Power distribution lines are located near site but there are no utility poles in the immediate vicinity of the dam. Where tying into municipal power supply advise Departmental Representative and contact the applicable jurisdictional power utility authorities.

1.7 WATER SUPPLY

.1 There is no running water supply of any kind, potable or otherwise on site. No drilled well exists.

.2 Provide and pay for potable water supply for cast-in-place concrete works. Do not draw water from water course for concrete work.

.3 Water may be drawn from river and in fact may be encouraged for other activities on the job site such as cleaning, or watering of grassed areas during establishment period. Where drawing water

from river, first advise Departmental Representative of intended use for approval. Where deemed unacceptable potable water must be used.

.4 Ensure any water supply is filtered and treated to a potable state. Unfiltered and untreated water drawn from another water source may introduce foreign contaminants, organisms or invasive plants or species which may be an ecological threat to the site environment.

1.8 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws. Burning rubbish and construction waste materials is not permitted on site without exception.

PART 2 - PRODUCTS

2.1 NOT USED

Not Used.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 14 00 – Work Restrictions.

.2 Section 01 33 00 – Submittal Procedures.

.3 Section 01 35 29 - Health and Safety Requirements.

.4 Section 01 35 43 – Environmental Procedures.

.5 Section 01 51 00 - Temporary Utilities.

.6 Section 01 56 00 – Temporary Barriers and Enclosures.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
.1 CSA-A23.1-09/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/ Test and Standard Practices for Concrete.
.2 CSA-O121-08 (R2013), Douglas Fir Plywood.
.3 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.
.4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

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

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.4 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

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

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use and restore site to original conditions or better.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

1.6 HOISTING

.1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists to be operated by qualified operator.

1.7 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with equipment, debris piles, and removable bins outside of pre-approved staging area determined in advance of Work.

1.8 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt the use of the facilities.

.2 The site area is limited and the Contractor must arrange and pay for any additional storage or work areas that are needed to complete the work.

.3 Provide and maintain adequate access to project site.

.4 Clean areas where used by Contractor's equipment.

.5 Provide snow removal during progress of work as required for access to project site.

1.9 SECURITY

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

1.10 OFFICES

.1 Provide a temporary portable office trailer for their use including: one office heated to 22°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide a temporary portable office trailer for use as a site office by the Departmental Representative:

.1 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with 4 50% opening windows and one lockable door.

.2 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.

.3 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.

.4 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10 % upward light component.

.5 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.

.6 Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.

.7 Maintain in clean condition.

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

.4 Subcontractors to provide their own offices as necessary.

.5 Location of offices to be coordinated with the Departmental Representative.

1.11 LIVING FACILITIES

.1 Living facilities and meals to be arranged by the Contractor.

1.12 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. Storage space on site is very limited. Keep materials, tools and equipment within approved designated areas. Plan material deliveries or waste removals in a manner to limit site storage requirements.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities and private operator’s site operations.

1.13 SANITARY FACILITIES

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

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

1.14 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.

1.15 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.2 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

.3 Protect travelling public from damage to person and property.

.4 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
.1 Also in accordance with Section 01 14 00.

.5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
.1 Also in accordance with Section 01 14 00.

.6 Do not construct new access trails or haul roads.

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

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

.9 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.10 Provide snow removal during period of Work.

1.16 CLEAN-UP

.1 Remove debris, waste materials, from work site daily to waste disposal staging area.

.2 Clean dirt or mud tracked onto paved or surfaced roadways and restore roadways to original conditions or better.

.3 Store materials resulting from demolition activities that are salvageable and removed from work site daily to waste disposal staging area.

.4 Stack stored new or salvaged material.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 – EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS — Not Used

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.
.2 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)
.1 CSA-O121-[M1978(R2003)], Douglas Fir Plywood.

.3 Ontario Ministry of Natural Resources (OMNR)
.1 Reptile and Amphibian Exclusion Fencing: Best Practices, Version 1.0. Species at Risk Branch Technical Note. [2013]

.4 Public Works Government Services Canada (PWGSC)
.1 Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 HOARDING

.1 Erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m on center. Provide one lockable truck gate. Maintain fence in good repair.

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

1.5 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs, and deck of dam.

.2 Provide as required by governing authorities.

1.6 REPTILE EXCLUSION FENCING

.1 Erect temporary reptile exclusion fences as directed by the Departmental Representative per OMNR Best Practices 2013.

1.7 WEATHER ENCLOSURES

.1 Design enclosures to withstand wind pressure and snow loading.

1.8 DUST TIGHT SCREENS	.1	Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
	.2	Maintain and relocate protection until such work is complete.
1.9 ACCESS TO SITE	.1	Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
1.10 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.
1.11 FIRE ROUTES	.1	Maintain access to property including overhead clearances for use by emergency response vehicles.
1.12 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY	.1	Protect surrounding private and public property from damage during performance of Work.
	.2	Be responsible for damage incurred.
1.13 PROTECTION OF BUILDING FINISHES	.1	Provide protection for finished and partially finished building finishes and equipment during performance of Work.
	.2	Provide necessary screens, covers, and hoardings.
	.3	Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
	.4	Be responsible for damage incurred due to lack of or improper protection.
1.14 WASTE MANAGEMENT AND DISPOSAL	.1	Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 NOT USED	.1	Not used.

PART 3 - EXECUTION

3.1 NOT USED	.1	Not used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Field engineering survey services to measure and stake site.

.2 Survey services to establish and confirm inverts for Work.

.3 Installation of geodetic bench marks on top of the new dam structure tied-in with existing referenced bench mark elevation.

1.2 MEASUREMENT AND PAYMENT PROCEDURES

.1 There shall be no separate measurement for payment for the work under this Section. Include cost in the Contract Lump Sum Price.

.2 Payment shall be made as set out in Section 01 22 01 and shall be included in the applicable item of work.

1.3 REFERENCES

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

1.4 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Ontario, acceptable to Departmental Representative Owner.

1.5 SURVEY REFERENCE POINTS

.1 Locate, confirm and protect control points prior to starting site work. Relocate and place permanent reference points during construction and after completion of Work.

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

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

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

1.6 SURVEY REQUIREMENTS

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

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

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

.4 Stake batter boards for foundations.

.5 Establish new foundation and sill elevations.

1.7 EXISTING SERVICES

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

.2 Remove abandoned service lines within 5 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.8 RECORDS

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

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

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

1.9 SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative

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

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

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

.2 Section 02 81 01 – Hazardous Materials

1.2 REFERENCES

.1 United States Environmental Protection Agency (USEPA)

.1 EPA 833-F-11-006 - Stormwater Best Management Practices: Concrete Washout [2012]

1.3 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, unless approved by Departmental Representative.

.3 Clear snow and ice from access to building, remove from site.

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

.5 Provide on-site containers for collection of waste materials and debris.

.6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.7 Dispose of waste materials and debris at designated dumping areas off site.

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

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

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

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

.13 Collect, retain and dispose all the concrete washout water (or washwater)and solids in leak proof containers in accordance with:
- .1 EPA 833-F-11-006 - Stormwater Best Management Practices: Concrete Washout (attached);
- .2 Section 01 74 21 Construction/Demolition Waste Management and Disposal; and
- .3 Section 02 81 01 – Hazardous Materials.

1.4 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, unless approved by Departmental Representative.

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

.7 Clean and polish hardware, stainless steel, and mechanical and electrical fixtures.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, walls, and deck.

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

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

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

.12 Remove dirt and other disfiguration from exterior surfaces.

.13 Sweep and wash clean concrete areas.

.14 Clean equipment and fixtures to sanitary condition.

.15 Clean drainage systems.

.16 Remove snow and ice from access to dam.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

.2

PART 2- PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.

.2 Carefully deconstruct and source separate materials/equipment and divert waste destined for landfill to maximum extent possible.

.3 Reuse, recycle, compost, burn or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.4 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.

.5 Protect environment and prevent environmental pollution damage.

1.2 RELATED SECTIONS

.1 Section 01 35 29.06 – Health and safety requirements.

.2 Section 01 35 43 – Environmental procedures.

.3 Section 01 41 00 – Regulatory requirements.

.4 Section 01 74 11 – Cleaning.

.5 Section 02 41 21 – Removals.

.6 Section 02 81 01 – Hazardous Materials

1.3 REFERENCES

.1 Reference Standards:

.1 Ontario Ministry of Environment:

.1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m^2.

.2 Ontario Environmental Protection Act (EPA)

.1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.

.2 Regulation 103/94, Source Separation Programs.

.3 Public Works and Government Services Canada (PWGSC)
.1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Prepare and submit following prior to project start-up:
.1 One copy and one electronic copy of completed Waste Audit (WA).
.2 One copy and one electronic copy of completed Waste Reduction Workplan.

.3 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.

.4 Registration of activities on the Ontario Hazardous Waste Information Network (HWIN), if applicable.

1.5 WASTE AUDIT (WA)

.1 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
.1 Provide facilities for collection, handling and storage of source separate wastes.
.2 Source separate the following waste:
.1 Cement and concrete.
.2 Corrugated cardboard.
.3 Wood.
.4 Steel.

1.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare and submit WRW (Schedule B) at least 10 days prior to project start-up.

.2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations.

.3 WRW should include but not limited to:
.1 Applicable regulations.
.2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
.3 List of approved Disposal Facilities
.4 List of approved Haulers
.5 Destination of materials identified.
.6 Deconstruction/disassembly techniques and schedules.
.7 Methods to collect, separate, and reduce generated wastes.

.8 Location of waste bins on-site.
.9 Security of on-site stock piles and waste bins.

.10 Protection of personnel, sub-contractors.
.11 Clear labelling of storage areas.
.12 Details on materials handling and removal procedures.
.13 Recycler and reclaimer requirements.
.14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
.15 Requirements for monitoring on-site wastes management activities.

.4 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project.

1.7 WASTE SOURCE SEPARATION PROGRAM (WSSP)

.1 As part of Waste Reduction Workplan, prepare a WSSP prior to project start-up.

.2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.

.3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.

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

.5 Locate containers to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimizes material damage.

.7 Clearly and securely label containers to identify types/conditions of materials accepted and assist in separating materials accordingly.

.8 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.

.9 On-site sale of salvaged materials is not permitted.

1.8 USE OF SITE AND FACILITIES

.1 Execute Work with minimal interference and disturbance to normal use of premises.

.2 Maintain security measures established by facility and provide temporary security measures approved by Departmental Representative.

1.9 WASTE PROCESSING SITES

.1 Province of Ontario:

.1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto ON M4V 1P5.
Telephone: 1-800-565-4923 or 416-323-4321
Fax: 416-323-4682

.2 Recycling Council of Ontario, 215 Spadina Ave. #225, Toronto ON M5T 2C7.
Telephone: 416-657-2797
Fax: 416-960-8053
Email: rco@rco.on.ca
Website: http://www.rco.on.ca/

.2 Contractor responsible for accessing a licensed/approved landfill site for both hazardous and nonhazardous materials. Submit location of the licensed landfill site to Departmental Representative for review.

1.10 QUALITY ASSURANCE

.1 After award of Contract, a mandatory site examination will be held for this Project for Contractor responsible for renovation demolition/deconstruction waste management.
.1 Date, time and location will be arranged by Departmental Representative.

.2 Waste Management Meeting: Waste Management Coordinator is to provide an update on status of waste diversion and management activities at each meeting. Written monthly Waste Diversion Report summary to be provided by Waste Management Coordinator.

.3 Submit proof that all waste is being disposed of at a licensed landfill site or waste transfer site. A copy of the disposal/waste transfer site’s license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.11 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed and salvaged materials from movement or damage.

.6 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.7 Separate and store materials produced during project in designated areas.

.8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
.1 On-site source separation is recommended.
.2 Remove co-mingled materials to off-site processing facility for separation.
.3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
.4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.12 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste volatile materials mineral spirits oil paint thinner into waterways, storm, or sanitary sewers.

.3 Concrete waste water having a pH ≥ 12.5 must be disposed of in accordance with Section 02 81 01 – Hazardous Materials.

.4 Keep records of construction waste including:
.1 Number and size of bins.
.2 Waste type of each bin.
.3 Total tonnage generated.
.4 Tonnage reused or recycled.
.5 Reused or recycled waste destination.

.5 Remove materials on-site as Work progresses.

.6 Prepare project summary to verify destination and quantities on a material-by-material basis.

1.13 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Do Work in compliance with WRW and WSSP.

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

3.2 CLEANING

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
.2 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.
.1 Mark containers or stockpile areas.
.2 Provide instruction on disposal practices.

.2 On-site sale of salvaged recovered reusable recyclable materials is not permitted.

3.4 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule G - Government Chief Responsibility for the Environment:

Province	Address	General Inquires	Fax
Ontario	Ministry of the Environment and Climate Change 135 St. Clair Avenue West Toronto ON M4V 1P5	416-323-4321 800-565-4923	416-323-4682
	Environment Canada Toronto ON	416-734-4494	

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 74 11 – Cleaning.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.2 INSPECTION AND DECLARATION

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Departmental Representative's inspection.

.2 Departmental Representative Inspection:

.1 Departmental Representative and Contractor to inspect Work and identify deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Certificates required have been submitted.

.4 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.

.2 When Work is deemed incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Final Payment:

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

.2 When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

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

1.3 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11.

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

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Product data, materials and finishes and related information.

.2 Warranties and bonds.

1.2 RELATED REQUIREMENTS

.1 Section 01 45 00 – Quality Control.

1.3 SUBMISSION

.1 Prepare instructions and data using personnel experienced in maintenance and operations of described products.

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 If requested, furnish evidence as to type, source and quality of products provided.

.5 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of manuals and documentation in English.

.6 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.7 Pay costs of transportation.

1.4 FORMAT

.1 Organize data in the form of a manual.

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

.3 When multiple binders are used correlate data into related consistent groupings.
.1 Identify contents of each binder on spine.

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

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

.6 Provide tabbed fly leaf for each separate product

and system, with typed description of product and major component parts of equipment.

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

.8 Drawings: provide with reinforced punched binder tab.
.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in “dwg” format on CD.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents: provide title of project;
.1 Date of submission; names
.2 Addresses and telephone numbers of Departmental Representative and Contractor with name of responsible parties.
.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.
.1 Section 01 45 00.

1.6 AS-BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in Supplementary 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 product data.
.6 Field test records.
.7 Inspection certificates.

.2 Store record documents and samples in field office apart from documents used for construction.
.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.
.1 Do not use record documents for construction purposes.

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

.6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of Work.

.7 If project is completed without significant deviations from Contract drawings and specifications, submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Other Documents: maintain inspection certifications, field test records, required by individual specifications sections.

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

1.8 FINAL SURVEY

.1 Submit final site survey certificate certifying that completed Work are in conformance, or non-conformance with Contract Documents.

1.9 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Store maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store components subject to damage from weather in weatherproof enclosures.

.3 Store paints and freezable materials in a heated and ventilated room.

.4 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.11 WARRANTIES AND BONDS

.1 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, within ten days after completion of applicable item of work.
.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.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for demolition to complete work as indicated by the drawings and specification.

.2 Work includes but is not limited to:
.1 Staged demolition of the existing Horseshoe Lake Dam. This includes:
.1 Removal of existing concrete as shown in the project drawings.
.2 Preparation of all concrete surfaces against which new concrete is to be cast.
.3 Disposing off site all concrete debris and removed steel reinforcement.
.4 Disposing off site of all material not designated for salvage or reuse by owner

1.2 RELATED SECTIONS

.1 Section 01 35 43 – Environmental Procedures.

.2 Section 01 41 00 – Regulatory Requirements

.3 Section 01 74 21 – Waste Management and disposal.

.4 Section 02 41 21 – Removals.

.5 Section 03 30 00 - Cast in place concrete.

.6 Section 32 91 19 – Topsoil Placement.

.7 Section 35 20 22 – Dewatering.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International).
.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Building Code of Canada (NBCC), including User's Guide, Part 8 – Safety Measures at Construction and Demolition Sites (2005).

.3 Ontario Occupational Health and Safety Act (OSHA).

.4 Ontario Building Code (OBC).

.5 Department of Justice Canada (Jus).
.1 Canadian Environmental Assessment Act(CEAA), 1992, c. 37.
.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33
SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.4 MEASUREMENT AND PAYMENT .1 Measurement Procedures: in accordance with Section 01 22 01 - Measurement and Payment.

.2 The work will be measured and paid for under payment items included in the Unit Price Table:
.1 Item No. 1 - Concrete Removal: This item covers the work described in section 1.1.2.1.1.

.3 No payment will be made for excavation or demolition beyond the limits shown on the drawings, which has not been authorized by the Departmental Representative. Any overbreak beyond these limits shall be replaced with concrete at the Contractor's expense.

1.5 SUBMITTALS .1 Submittals in accordance with Section 01 33 00.

.2 Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.3 Waste Reduction Workplan: prior to beginning of work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 and indicate:
.1 Descriptions of and anticipated quantities of materials to be salvaged reused, recycled and landfilled.
.2 Schedule of selective demolition.
.3 Number and location of dumpsters.
.4 Anticipated frequency of tippage.
.5 Name and address of haulers and waste facilities.

.4 Certificates: submit certified weight bills and or 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 haulers and facilities listed in Waste Reduction Workplan.

.5 Prior to demolition of the existing structure, establish reference points (minimum of 4) that will allow the transfer of the coordinates and elevations of the existing geodetic bench mark to the new geodetic bench mark on the new structure or such other approach as approved by the Departmental Representative. Provide all data regarding the reference points to the Departmental Representative. Survey work shall be undertaken by an Ontario Legal Survey.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, Fisheries Act, Species at Risk Act, and applicable Provincial/Territorial regulations.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Perform Work in accordance with Section 01 35 43.

.2 Storage and Protection.
.1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
.2 Remove and store materials to be salvaged, in manner to prevent damage.
.3 Store and protect in accordance with requirements for maximum preservation of material.
.4 Handle salvaged materials as new materials.

.3 Waste Management and Disposal.
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.
.2 Divert excess materials from landfill to site approved by Departmental Representative.
.3 Separate for reuse and recycling and place in designated containers Steel, Metal waste in accordance with Waste Management Plan.
.4 Place materials defined as hazardous or toxic in designated containers.
.5 Ensure emptied containers are sealed and stored safely.
.6 Source separate for recycling materials that cannot be salvaged for reuse including wood, metal, concrete and asphalt.
.7 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

1.8 SITE CONDITIONS

.1 Site Environmental Requirements.
.1 Perform work in accordance with Section 01 35 43.

.2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

Review existing site conditions and take necessary precautions to protect environment and adjacent non-work areas.

1.9 SCHEDULING

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.1 Notify Departmental Representative in writing when unforeseen delays occur.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Prevent movement, settlement, or damage to any parts of structures that are to remain in place. Provide bracing and shoring as required.

.2 Keep Noise, dust, and inconveniences to nearby occupants to a minimum.

.3 Provide temporary dust screens, covers, railings, supports and other protection as required.

.4 Sawcut and line drill existing wall to depth indicated on drawings. Use small, hand operated chippers for demolition and excavation components from approximately 1 metre away from sawcuts.
.1 Take special care not to damage the structural integrity of the remaining portion of the remaining concrete by using equipment of appropriate weights (maximum lOkg).

3.2 PROTECTION

.1 Support affected structures and, if safety of structure being demolished or remaining component of structure appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.

3.3 SAFETY CODE

.1 Install temporary barriers and enclosures for demolition work in accordance with Section 01 56 00.

.2 Blasting operations not permitted during demolition.

3.4 DEMOLITION

.1 Demolish components of structure as shown on drawings and specified in specifications.

.2 Crush concrete generated due to demolition of structure to size suitable for recycling
.1 For further information regarding acceptable uses contact Provincial/Territorial aggregate producers associations and or Ministries of Transportation.

.3 Selective demolition as indicated on drawings.

.4 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.

3.5 REMOVAL OPERATIONS

.1 Remove items as indicated.

.2 Do not disturb items designated to remain in place.

.3 Remove designated trees if required, during demolition.
.1 Obtain written approval of Departmental Representative prior to removal of trees not designated on the drawings.

.4 Grind, chip, or shred other vegetation for mulching and composting.

.5 Stockpile topsoil for final grading and landscaping.
.1 Provide erosion control and seeding if not immediately used.
.2 Provide reptile fencing around stockpiles to prevent turtle nesting. Submit drawing to Departmental Representative for approval.

3.6 STOCKPILING

.1 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.2 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling Procedures.

3.7 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

.2 Transport material designated for alternate disposal using approved facilities listed in Waste Reduction Workplan and in accordance with applicable regulations.
.1 Written authorization from Departmental Representative is required to deviate from facilities listed in Waste Reduction Workplan.

.3 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
.1 Disposal Facilities: approved and listed in Waste Reduction Workplan.

.2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.8 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

3.9 CLEANING

.1 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.2 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT PROCEDURES

.1 Removals of existing concrete dam including west access wingwall, concrete deck, abutments, and concrete piers, including steel gain liners, above the existing dam sill will be measured by cubic meter for payment and includes all costs related to removal, transport and disposal of waste material off site. Removals extending beyond limits directed by Departmental Representative will not be paid for.

.2 Removal of existing dam sill concrete to partial depth as directed by Departmental Representative shall be measured by cubic metre for payment and includes all costs related to removal, transport and disposal of waste material off site. Removals extending beyond limits directed by Departmental Representative will not be paid for.

.3 Payment for all concrete removals not measured for payment as described above will be included in the Lump Sum Price.

1.2 DESCRIPTION

.1 This section covers the removal and re-installation, after concrete work is completed, of the following items:

- .1 Log lifting devices
- .2 Dam Safety Signs (some new signs will also be installed to complement new public cross walk)
- .3 Existing picket style guardrails of 1070 mm height as indicated on drawings

.2 This section includes the removal of existing stoplogs and all other items that not listed above but must be removed to complete the work and reinstalled after, as described in the specification and/or as shown on the drawings.

.3 Refer to drawings for locations of items to be re-installed. Some items may require modification prior to installation to suit the new dam as indicated on drawings and these specifications. Other minor modifications such as mounting details and hardware may also be coordinated on site with Departmental Representative.

1.3 PROTECTION

.1 Protect existing structures or parts of structures designated to remain. In the event of damage, make repairs and replacements to the approval of, and at no additional cost, to the Departmental Representative.

.2 Protect all exposed electrical wiring and conduits during the concrete excavation, forming, heating and placement of concrete.

PART 2 - PRODUCTS

2.1 NOT USED

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Inspect the site and verify with the Departmental Representative objects designated to be removed and objects to be preserved.

.2 Notify appropriate utility authorities as required before starting any excavation, demolition, clearing and grubbing.

3.2 REMOVALS

.1 Do not disturb adjacent work designated to remain in place.

.2 Items not designated to be salvaged are to be disposed of in a manner approved by the Departmental Representative. Some items may also be reclaimed by Parks Canada. Where such is the case coordinate hand over and transport of material to Parks Canada storage facility with Departmental Representative.

3.3 SALVAGE

.1 Carefully dismantle materials designated to be salvaged and safely stockpile at locations designated / approved by the Departmental Representative.

.2 Carefully dismantle components designated to be salvaged, label, and take all measurements required for re-installation. Store in a location approved by the Departmental Representative.

3.4 REINSTALLATION

.1 Reinstall all items which were removed as a result of construction activities to match prior to construction condition and the Departmental Representative's approval.

.2 Reinstall as indicated on the drawings or as per existing details, and to the Departmental Representative's approval all items which were removed as a result of construction activities. Supply and install new anchors and hardware, for all items listed in this section, as required for re-installation.

.3 Take all necessary measurements and surveys to ensure that all hardware can be relocated in accordance to the drawings.

.1 Reinstall horizontal and vertical anchors which were removed as a result of the concrete work.

.2 Make all necessary adjustments to ensure proper fit, closure and operations of all gates to sill.

3.5 DISPOSAL OF MATERIALS .1 Dispose of materials not designated for salvage or reuse in work off the site.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS Not used.

1.2 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.
.1 Waste water having a pH ≥ 12.5 is considered a hazardous waste under Ontario Regulation 347.

.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 Green Seal Environmental Standards (GS)
.1 GS-11-[2008, 2nd Edition], Paints and Coatings.
.2 GS-36-[00], Commercial Adhesives.
.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).
.5 National Research Council Canada Institute for Research in Construction (NRC-IRC)
.1 National Fire Code of Canada-[2005].
.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-[A2007], Architectural Coatings.
.2 SCAQMD Rule 1168-[A2005], Adhesive and Sealant Applications.
.7 R.R.O. 1990, Regulation 347, General — Waste Management

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS in accordance with Sections 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with [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.
.1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials 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 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
.2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval

of the Departmental Representative

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

PART 2 - PRODUCTS

2.1 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.

PART 3 - EXECUTION

3.1 CLEANING

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

.2 Leave Work area clean at end of each day.

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

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

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is 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

PART 1 – GENERAL

1.1 RELATED SECTIONS

.1 Section 03 20 00 - CONCRETE REINFORCING

.2 Section 03 30 00 - CAST-IN-PLACE CONCRETE

1.2 MEASUREMENT PROCEDURES

.1 No measurement will be made under this Section. Include costs in items related to cast-in-place concrete for which concrete formwork, falsework and accessories are required.

1.3 REFERENCES

.1 Canadian Standards Association (CSA)
.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-086.1-01(R2006), Engineering Design in Wood (Limit States Design).
.3 CAN/CSA-086.181-05, Supplement No. 1to CAN/CSA-086-01, Engineering Design in Wood (Limit States Design).
.4 CSA 0121-08, Douglas Fir Plywood.
.5 CSA 0151-09, Canadian Softwood Plywood.
.6 CSA 0153-M1980(R2008), Poplar Plywood.
.7 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
.8 CAN/CSA-S269.3-M92(R2008), Concrete Formwork.

.2 Council of Forest Industries of British Columbia (COFI)
.1 COFI Exterior Plywood for Concrete Formwork.

1.4 SHOP DRAWINGS

.1 Submit stamped shop drawings for formwork and falsework in accordance with Section 01 33 00.

.2 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. Comply with CSA 8269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

1.4 SHOP DRAWINGS (Cont'd)

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Indicate sequence of erection and removal of formwork/falsework to minimize exposure time to adverse weather conditions.

.5 Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

1.5 REQUIREMENTSOF REGULATORY AGENCIES

.1 Conform to municipal, provincial and national codes relating to design and construction of formwork and falsework.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 and section 01 35 43.

.2 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOCs. Maximum VOC level to be 250g/L based on EPA test method 24 and biodegradability as described by EPA as having a half-life of 28 days or less based on ASTM D5684/OECD 301B.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Formwork materials:
.1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-086.1 CSA-0153.

.2 Form ties: use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.

.3 Form release agent: non-toxic, biodegradable, low VOC. Maximum VOC level to be 250g/L based on EPA test method 24 and biodegradability as descried by EPA as having a half-life of 28 days or less based on ASTM D5684/OECD 301B.

2.1 MATERIALS (Cont'd)

.4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm2/s at 40°C, flashpoint minimum 150°C, open cup.

.5 Falsework materials: to CSA-S269.1.

.6 Formwork liner: Reusable Type III controlled permeability formwork (CPF) liner consisting of integrally bonded non-woven fabric and plastic mesh.
. 1 The approved Type III CPF liner shall have the following properties:
.1 A maximum compression of less than 10% under pressure of 200 kPa.
. 2 A maximum pore size of less than 0.05 mm.
. 3 A minimum water retention capacity of 1.3 litres/m2 •
. 4 A maximum absorbency of 0.1 litres/m2•
. 2 Acceptable product or equal: Zemdrain MD self-adhesive application manufactured by DuPont and distributed by Max Frank (Canada) Inc. (1-888-244-4668). Roll size 35m x 2.5m x 2.2mm.

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.

.2 Fabricate and erect falsework in accordance with CSA-S269.1.

.3 Do not place shores and mud sills on frozen ground.

.4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.5 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.

.6 Align form joints and make watertight. Keep form joints to minimum .

3.1 FABRICATION AND ERECTION (Cont'd)

.7 Use 25 mm chamfer strips on external corners and edges of deck unless specified otherwise. Form 76 mm radius fillet on all edges and corners of piers unless specified otherwise. Refer to drawings for detailing of chamfers and fillets.

.8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes.

.10 Clean formwork in accordance with CSA-A23.1/ A23.2, before placing concrete.

3.2 FORMWORK LINER

.1 Install controlled permeability formwork self-adhesive liner as per manufacturer's instructions on all formed surfaces.

3.3 FORM RELEASE AGENT

.1 No form release agent is required with CPF formwork liner applied as indicated.

.2 Apply agent where CPF formwork liner cannot be installed, such as but not limited to the corner chamfers. Surface preparation:
.1 Protect adjacent surfaces not designated to receive concrete form release.
.2 Clean and prepare surfaces to receive form release in accordance with manufacturer's instructions.
.3 Clean form surfaces thoroughly prior to application.
.4 Remove all rust, scale and/or previously used form release agents from the forms in accordance with good concrete practices .
.5 When using new wooden forms, form release shall be applied and re-applied until complete saturation has been accomplished prior to first use.

.3 Application:
.1 Apply concrete form release in accordance with manufacturer's instructions.

3.4 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.
.1 Seven days

.2 Provide all 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.

.3 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

.4 Do not remove winter protection

3.5 FORMWORK AT ROCK AND FOUNDATION INTERFACES

.1 Scribe formwork and trim panels to prepare neat contact with foundation material.

END OF SECTION

PART 1 – GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for concrete reinforcement as described by the drawings and the specification.

1.2 RELATED SECTIONS

.1 Section 03 10 00 - Concrete forming and Accessories.

.2 Section 03 30 00 - Cast-in-Place Concrete.

.3 Section 01 33 00 - Submittal Procedures.

1.3 MEASUREMENT AND REFERENCES

.1 Measurement Procedures: in accordance with Section 01 22 01.

.2 Measure reinforcing steel including any dowels and splices in kilograms of steel incorporated into Work, computed from theoretical unit mass specified in CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Departmental Representative.

.3 Payment for concrete reinforcing shall include all material and labour for installation.

.4 Wire ties, bar supports, chairs, spacers and other accessories in addition to reinforcing steel are considered included in the placing of concrete and will not be measured separately for payment.

.5 All other work of this section, which is not identified as a unit price item, is to be included in the Lump Sum Price stated in the Tender Form.

1.4 REFERENCES

.1 ASTM International

.1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.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 CSA-A23.3-04 (R2010), Design of Concrete Structures.
.3 CSA G30.3-M1983(R1998), Cold Drawn Steel wire for Concrete Reinforcement .
.4 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
.5 CSA-G40.20-04(R2009)/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.6 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)
.1 RSIC-2013, Reinforcing Steel Manual of Standard Practice.

1.5 SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice .

.3 Shop Drawings:
.1 Submit drawings indicating 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, with identifying code marks to permit correct placement without reference to structural drawings.
.5 Indicate sizes, spacings and locations of chairs, spacers and hangers.

1.5 SUBMITTALS (Cont'd)

.3 Shop Drawings: (Cont'd)
.2 Detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated.
.1 Provide type B tension lap splices unless otherwise indicated.

1.6 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 33 00.
.1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum three (3) weeks prior to beginning reinforcing work.
.2 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 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground off in dry location and in accordance with manufacturer's recommendations in clean, dry, area .
. 2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.

.4 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

2.1 MATERIALS (Cont'd)

.5 Mechanical splices: subject to approval of Departmental Representative.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario, Canada.

.2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

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 and in accordance with CSA A23.1/A23.2.

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.3 Minimum cover for reinforcement: 75 mm unless indicated otherwise.

.4 Ensure cover to reinforcement is maintained during concrete pour.

END OF SECTION

PART 1 – GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for cast-in-place concrete placed as described by the drawings and the specifications.

1.2 RELATED SECTIONS

.1 Section 03 10 00 - Concrete forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 05 05 20 - Anchors.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 Measurement Procedures: in accordance with Section 01 22 01.

.2 Work covered by this section will be paid for under payment items included in the Unit Price Table:

.1 Cast-in-place concrete in the sill slab will be measured by the cubic metre calculated from neat dimensions indicated on drawings.

.2 Cast-in-place concrete in the piers will be measured by the cubic metre calculated from neat dimensions indicated on drawings.

.3 Cast-in-place concrete in the west abutment will be measured by the cubic metre calculated from field measured dimensions authorized in writing by the Departmental Representative.

.4 Cast-in-place concrete in the west cut-off wall will be measured by the cubic metre calculated from field measured dimensions authorized in writing by the Departmental Representative.

.5 Cast-in-place concrete in the west wingwall will be measured by the cubic metre calculated from field measured dimensions authorized in writing by the Departmental Representative.

.6 Cast-in-place concrete in the east abutment will be measured by the cubic metre calculated from field measured dimensions authorized in writing by the Departmental Representative.

1.3 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.7 U fill in the east abutment will be measured by the cubic metre calculated from field measured dimensions authorized in writing by the Departmental Representative.

.8 Cast-in-place concrete in the east cut-off wall will be measured by the cubic metre calculated from field measured dimensions authorized in writing by the Departmental Representative.

.9 Cast-in-place concrete in the deck of the dam will be measured by the cubic metre calculated from neat dimensions indicated on drawings.

.10 Cast-in-place concrete in the west approach slab will be measured by the cubic metre calculated from neat dimensions indicated on drawings.

.11 Cast-in-place concrete in the east approach slab will be measured by the cubic metre calculated from neat dimensions indicated on drawings.

.12 Non-shrinkable, non-metallic cementitious grout in the gain and sill embedments will be measured by the cubic metre calculated from neat dimensions indicated on drawings.

.13 Mass cast-in-place concrete in 'fill concrete under sill slab' will be measured by cubic metres calculated from field measured dimensions authorized in writing by the Departmental Representative.

.14 No deductions will be made for volume of concrete displaced by reinforcing steel.

.15 Include in the prices of concrete the installation of all items embedded therein.

.16 Include in the prices of concrete the work described in Section 03 10 00 .

.17 Include in the prices of concrete the supply and installations of waterstops.

.18 Include in the prices of concrete the supply and installation of joint filler, bond breaker and joint sealer.

.19 Include in the prices of concrete the heating, cooling, hot and cold weather protection, curing, and finishing.

1.3 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)

.20 All other work, necessary to the completion of the work of this section, will not be measured separately for payment, but will be considered incidental to the work.

1.4 REFERENCES

.1 Reference Standards:

.1 ASTM International

.1 ASTM C260-/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM Cl017/Cl017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.5 ASTM D412-06a(2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.6 ASTM D570 -98(2010)el, Standard test Method for Water Absorption of Plastics.

.7 ASTM 0624-00(2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.8 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types.

.9 ASTM Dl752-04a(2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 CSA International

.1 CSA A23.l-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit warranty performance parameters of concrete for review, including supporting back-up data and manufacturer's data sheets.

1.5 SUBMITTALS (cont'd)

.3 At least four (4) weeks prior to beginning work, submit to Departmental Representative concrete mix design and product data of the following materials proposed for use: aggregate source, curing compound, joint filler, joint sealant, and waterstops.

.4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken.

.5 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 90 minutes for concrete to be delivered to site of work and discharged after batching.

1.6 QUALITY ASSURANCE

.1 Provide Departmental Representative, minimum four (4) weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

. 1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.2 Minimum four (4) weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
.1 Hot weather concrete.
.2 Cold weather concrete.
.3 Curing.
.4 Finishes.
.5 Formwork removal.
.6 Joints.

.3 Ensure that the mix design is adjusted suitably to prevent alkali aggregate reactivity problems.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.2 Modifications to maximum time limit must be agreed by the Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

1.8 REQUIREMENTS OF REGULATORY AGENCIES

.1 Conform to municipal, provincial and national codes relating to design and construction of formwork.

PART 2 – PRODUCTS

2.1 APPROVALS

.1 All materials to be new and approved by the Departmental Representative.

.2 All concrete mixes to be approved by the Departmental Representative.

2.2 DESIGN CRITERIA

.1 To CSA A23.1/A23.2, and as described in CONCRETE MIX of PART 2 - PRODUCTS.

2.3 MATERIALS

.1 General:
.1 Do not use calcium chloride or compounds, or admixtures containing calcium chloride.
.2 Use consistent concrete ingredients, uniformly proportioned from batch to batch.

.2 Cement: to CAN/CSA-A3001, Normal Type GU.

.3 Supplementary cementing materials: with 20% to 30% hydraulic slag, by mass of total cementitious materials to CAN/CSA-A3001.

.4 Cementitious hydraulic slag: to CAN/CSA-A3000-08.

.5 Water: to CSA A23.1/A23.2.

2.3 MATERIALS (cont'd)

.6 Aggregates: to CSA A23.1/A23.2.
.1 hard, dense, well graded aggregates of normal mass-density, approved by the Departmental Representative both as to quality and source:
.2 Aggregates to be free from materials identified as having deleterious reactions with certain constituents of cements. Minimal amounts of these reactive materials will be given consideration for inclusion - the basis of consideration will be:
.1 Conformance to the requirement of CAN/CSA-A23.1/A23.2; and/or
.2 The performance criteria as given in Clause 5.9 of CAN/CSA-A23.1/A23.2.

.7 Admixtures:
.1 Air entraining admixture: to ASTM C260.
.2 Chemical admixture: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
.3 Superplasticizers: to ASTM Cl017.

.8 Curing compound: to CSA A23.1/A23.2 white and to ASTM C309, Type 1-chlorinated rubber.

.9 Waterstops:
.1 PVC waterstop:
.1 To be a flexible PVC (Polyvinyl chloride) extruded from an elastomeric plastic material of which the basic resin is prime virgin polyvinyl chloride. The PVC compound shall not contain any scrapped or reclaimed material or pigment whatsoever.
.2 For all expansion joints: ribbed with centerbulb type having the following dimensions: 150 mm wide by 9.5 mm thick.
.3 Performance Requirements to meet:
.1 Tensile strength: to ASTM D638 - 13.8 MPa(2000 psi).
.2 Tear resistance: 43.78N/mm or 102 kg/25.4 mm (225 lb/in) to ASTM D624.
.3 Ultimate elongation: minimum 300% to ASTM D638.
.4 Water absorption: 0.005 to 0.02% to ASTM D570.
.5 Low temperature brittleness: to ASTM D746, passed@ -37.2°C/-38.3 (-35°F/-37).
.6 Cold bend test at -45°C for 2 hours - no cracking.

2.3 MATERIALS (Cont'd)

.7 Stiffness in flexure: 4.8 kPa 700 psi) to ASTM D747.

.8 Specific Gravity (ASTM D792) - 1.4.

. 2 Hydrophilic waterstop:

.1 To be used only where approved by Departmental Representative.

.2 Rectangular profile measuring 7 mm thick x 25 mm wide and incorporating hollow longitudinal compression openings.

.3 Comprised of non-bentonite synthetic chloroprene rubber.

.4 Co-extruded hydrophilic and non-hydrophilic composition.

.5 Hardness exceeding 50 (ASTM-D2240).

.6 Tensile strength exceeding 30 kg/cm2•

.7 Elongation of synthetic chloroprene rubber exceeding 600% (ASTM-D412).

.8 Elongation of chloroprene rubber only exceeding 400% (ASTM-D412).

.9 Volume expansion capability exceeding 3.0 times original size.

.10 Adhesive and sealant as recommended by waterstop manufacturer.

.10 Premoulded joint fillers:

.1 ASTM 0175-05 (2011) - Standard Specification for preformed Closed Cell polyolefin Expansion Joint Fillers for Concrete Paving and Structural Construction.

.11 Joint Sealer: to Can/CGSB-19.12 Sealing Compound, Two part component, elastomeric, chemical curing. Type I for Horizontal joints,
Type II for vertical joints.

.12 Bonding agent: To ASTM C1059/C1059M-99 (2008).

.13 Polyethylene foam: use as a bond breaker between joint filler and sealer as shown on drawings.

2.4 CONCRETE MIX

.1 Proportion concrete mix in accordance with CSA A23.1/A23.2 to meet following requirements - All classes of concrete:
.1 Cement: Mix of Type GU Portland cement and a cementitious hydraulic slag cement ranging between 20% and 30%.
.2 Minimum compressive strength at 28 days: 35 MPa.
.3 Maximum water/cementing materials ratio: 0.45.
.4 Class of exposure: F-1 .
.5 Nominal size of coarse aggregate: 20 mm .
.6 Slump at time and point of discharge without superplasticizer: 50 to 110 mm. Maximum slump 150mm with superplasticizer
.7 Air content: 5 to 8% .
.8 Admixtures, Water reducing agents: quantity to manufacturer's recommendation.
.1 Do not use calcium chloride or materials containing calcium chloride .
.9 Weigh aggregates, cement, water and admixture separately when batching. No alternative method of measuring will be permitted.
.10 Provide quality management plan to ensure verification of concrete quality to specified performance .
.11 Concrete supplier's certification: both batch plant and materials meet CSA A23.1/A23.2 requirements.
.12 Maximum aggregate 20mm for sections thiner than 500mm. 40mm for sections and members thicker than 500mm

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.
.1 Provide 48 hours minimum notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00. Ensure that reinforcing steel, and other necessary items are in-place, clean and undamaged.

3.1 PREPARATION (Cont'd)

.3 Use proper and timely placing, finishing and curing practices.

.4 During concreting operations:
.1 Development of cold joints is not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.5 Pumping of concrete is permitted only after approval of equipment and mix.

.6 Ensure reinforcement and inserts are not disturbed during concrete placement.

.7 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather .

.8 Protect previous work from staining.

.9 Clean and remove stains prior to application of concrete finishes.

.10 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.11 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 FORMWORK

.1 Construct mortar-tight formwork in accordance with reviewed formwork drawings, maintain tolerances of finished concrete work as specified in CAN/CSA-A23.1/A23.2.

.2 Where forms appear to be unsatisfactory stop work until defects corrected.

.3 Strip forms to CAN/CSA-A23.1/A23.2.

3.3 INSTALLATION/ APPLICATION

.1 Do cast-in-place concrete work in accordance to CSA A23.1/A23.2.

3.3 INSTALLATION/ APPLICATION (Cont'd)

.2 Place concrete continuously from start to finish:
.1 At such rates as to permit satisfactory placing and compaction - plan the work and use such methods such methods and performance rates as to allow
no cold joints and/or honeycomb;
.2 During clement weather or with protection;
.3 During daylight hours;
.4 Without unscheduled construction joints.

.3 When applicable - pumping concrete:
.1 Arrange equipment so that no vibrations result which might damage freshly placed concrete. Use reversible pumps.
.2 Operate pump so that a continuous stream of concrete without air pockets is produced.
.3 When pumping is discontinued and concrete remaining in pipe line is to be used, void pipe line in a manner that prevents contamination of concrete or separation of ingredients.

.4 Embedded parts:
.1 Set other embedded parts and openings as indicated or specified elsewhere.
.2 Check locations and sizes of embedded parts and openings shown on drawings.

.5 Anchor bolts:
.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
.2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.
.1 Drilled holes: 25 mm minimum diameter larger than bolts used to manufacturers' recommendations.
.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
.4 Set bolts and fill holes with shrinkage compensating grout.

.6 Do not commence placing concrete until the Departmental Representative has inspected and approved forms, falsework, reinforcing steel, conveying, spreading consolidation and finishing equipment, and curing and protective methods.

3.3 INSTALLATION/ APPLICATION (Cont'd)

.7 Joint fillers:
.1 Furnish filler for each joint in single piece for depth and width required for joint,

unless otherwise authorized by Departmental Representative. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
.2 Locate and form construction and expansion joints as indicated. Install joint filler, bond breaker and sealer.

.8 Joint Sealant:
.1 Install to manufacturer's recommendations.

.9 Waterstops (PVC and hydrophilic}:
.1 Install waterstops at locations shown on the drawings and to CAN/CSA-A23.1/A23.2-09. Follow manufacturer's recommendations.
.2 Install waterstops to provide continuous water seal.
.3 Do not distort or pierce waterstop in way as to hamper performance.
.4 Do not displace reinforcement when installing waterstops.
.5 Use equipment to manufacturer's requirements to field splice waterstops.
.6 Tie waterstops rigidly in place.
.7 Use only straight heat sealed butt joints in field.
.8 Use factory welded corners and intersections unless otherwise approved by Departmental Representative.
.9 Use adhesive and sealant as recommended by waterstop manufacturer.

.10 Finishing and curing:
.1 Finish concrete in accordance with CAN/CSA-A23.1/A23.2.
.2 Unformed surface concrete tolerance to conventional classification in accordance with straight edge method .
.3 Use wood float finish for unformed surfaces.
.4 Fill all holes due to formwork installation with concrete and smooth with steel trowel.

3.4 BONDING AGENT

.1 Apply two coats of bonding agent on all sawcut and other stone faces in contact with new concrete.
Follow the manufacturer's instructions for application.

3.5 CURING

.1 If formwork is left in place for 7 days or more, no additional curing will be required. If formwork is removed in less than 7 days, cure with double-layer of wet burlap. Maintain burlap in place and keep thoroughly wet for 7 days after day of placing.

.2 Unformed surfaces: cure with burlap and water. Carefully place two layers of damp burlap on the surface of the concrete. Overlap each strip by at least 75 mm and secure against displacement by wind. Maintain burlap in place and keep thoroughly wet for 7 days after day of placing.

.3 During curing period uncover only such areas that are immediately needed for finish treatment. Recover and continue curing.

3.6 COLD WEATHER PROTECTION

.1 For concrete and grout placed when air temperature is at or below 5 degrees Celsius, in addition to cold weather requirements of CAN/CSA-A23.1/A23.2:
.1 Protect concrete by a windproof shelter of canvas or other material to allow free circulation of inside air around fresh concrete. At no point let walls of shelter touch formwork. Provide sufficient space for removal of formwork for finishing. Supply approved heating equipment. Vent the products of combustion outside the protective shelter. Equipment shall be capable of keeping inside air at a constant temperature sufficiently high to maintain concrete at following curing temperatures:
.2 Ensure that a minimum substrate temperature of 5 degrees Celsius shall be achieved and maintained, prior to concrete pour.
.3 For an initial 3 days, at a temperature of not less than 15 degrees Celsius nor more than 27 degrees Celsius at concrete surfaces.
.4 Cure at not less than 10 degrees Celsius for an extra 4 days until 7 days from final pour.
.5 Keep concrete surfaces moist continuously while protected.

3.6 COLD WEATHER PROTECTION (Cont'd)

.6 Reduce temperature at a rate not exceeding 10 degrees Celsius per day until outside temperature has been reached.

3.7 HOT WEATHER REQUIREMENTS

.1 When applicable, during hot weather place concrete to hot weather requirements of CAN/CSA-A23.1/A23.2, clause 21.2. Ensure concrete temperatures at placing meet the requirements of Table 15: take suitable control measures when mixing ingredients.

3.8 FIELD QUALITY CONTROL

.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 . . 1 Ensure testing laboratory is certified to CSA A283.

.2 Departmental Representative will pay for costs of tests.

.3 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent for a minimum period of 72 hours.

.4 If tests do not meet requirements of the Departmental representative, take such measures as indicated in CAN/CSA-A23.1/A23.2, after confirmed approval by the Departmental Representative.

.5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.6 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

.7 The contractor must have maximum-minimum thermometers installed in accessible locations within the cold weather curing enclosure prior to pouring for the Departmental Representative to inspect during the pour and curing period. Ensure thermometers are properly acclimatized to concrete pour temperature within the curing enclosure and reset immediately following the pour at start of curing period.

3.8 FIELD QUALITY CONTROL (Cont'd)

.8 Contractor to submit a quality control plan to the Departmental Representative detailing proposed method of preventing cracking due to rapid shrickage of the concrete.

3.9 CLEANING

.1 Cleaning of concrete equipment to be done in accordance with Section 01 35 43.

.2 Divert unused concrete materials from landfill to local quarry or facility after receipt of written approval from Departmental Representative.

.3 Provide appropriate area on job site where concrete trucks can be safely washed. The pH level of uncured concrete is considered highly toxic to aquatic organisms. Concrete washout onto ground is therefore prohibited due to proximity and risk of contamination of watercourse. All concrete washout of truck, chute and any tools and equipment must occur in a leak proof container. Any concrete spills or overruns during pours must also be promptly picked up and deposited into leak proof containers. Refer to EPA Best Management Practices Guide for Concrete Washout for guidance on environmentally acceptable washout procedures.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for drilling anchor holes, and supply and installation of anchors, including grouting, as described by the drawings and the specification.

.2 The site lies in an area of granitic gneiss bedrock with relative compressive strength of 62 MPa for diametral and 79 MPa for axial.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

1.3 QUALIFICATIONS

.1 The installation of the anchors Type A (rock anchors) is to be performed by a contractor with at least five (5) years experience in this type of work.

.2 The Contractor is obligated to provide examples of relevant experience to the Departmental Representative, if requested. Proof of the crew experience providing the work may also be requested.

1.4 MEASUREMENT AND PAYMENT

.1 The work of the anchor installation will be measured and paid in accordance with Section 01 22 01. This work will be paid for under the payment item included in the Unit Price Table:

.1 Anchors Type A (Rock Dowel) - per linear metre (m).

.2 The price for Type A anchors includes:

.1 Drilling including casing when required; setting; supplying and placing the anchor grout; and proof testing of anchors selected by Departmental Representative.

.3 Housing and heating are included in the unit price for each anchor.

.4 All other work, necessary for the completion of the work of this section, will not be measured separately for payment, but will be considered as incidental to the work of this section.

1.5 SEQUENCE OF WORK

.1 Anchors Type A shall be installed with drilling for

anchors before the sill concrete is cast

PART 2 - PRODUCTS

2.1 MATERIALS-GENERAL

.1 Use materials approved by the Departmental Representative.

.2 Supply anchors in one piece, up to maximum continuous length produced by manufacturer. Strength of couplings to be equal to bar.

.3 Anchors to be complete with all accessory parts as specified by the manufacturer, and additional accessories indicated on the drawings or described in the specification.

.4 Adhesive type anchors to be anchored with epoxy acrylate resin. Polyester resins will not be accepted.

.5 All steel components of the anchor to be hot dipped galvanized.

.6 Clean steel surfaces of all deleterious matter. Remove grease or oils thoroughly. Bars showing pitting will be rejected.

.7 Store bars straight, and protect threads.

.8 Deliver cementitious materials in clearly marked, sealed bags.

.9 Store materials in dry, heated enclosure maintained between 2 and 40 degrees C.

.1

2.2 TYPE A ANCHORS

.1 Deformed bars to CAN/CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement, grade 400R

.2 35M dowels in the sill of sluice as shown on drawings.

2.3 TYPE A ANCHORS GROUT

.1 Proportion non-shrink non-metallic grout mix to comply with the following requirements:

- .1 3 days compressive strength: 42 MPa;
- .2 7 days compressive strength : 48 Mpa;
- .3 28 day compressive strength: 56 MPa;
- .4 Do not use expanding or shrinkage compensating agents, unless otherwise approved by Departmental Representative.
- .5 Use admixtures, including superplasticizers

and anti-washout agents as required.

.6 Alternatively, a cable grout approved by the manufacturer of the anchors can be used.

PART 3 - EXECUTION

3.1 GENERAL

.1 Except as specified in this section, install to the manufacturer's recommendations.

.2 Minimum substrate temperature shall be maintained at 5° Celsius minimum, prior to grouting.

.3 The Contractor is to provide to the Departmental Representative a complete list of equipment which will be used for work, prior to starting any work.

3.2 STRESSING EQUIPMENT

.1 Supply tensioning equipment specially adapted to the anchor system used.

.2 Design equipment to impose a controlled force gradually, inducing no dangerous secondary stresses in the bar, anchor head or supported structure.

.3 Tension anchor in one operation.

.4 Provide load cells which are robust and appropriately protected for site work; capable of accurate centering on the jack to ensure co-axiality with the bar. Provide calibration certificates.

.5 Calibrate load recording instruments with the actual tendon to be used on site.

.6 Provide calibration certificates for pressure gauges. Mount duplicate gauges adjacent to the jack, when the pump is more than Sm from the jack. Provide gauge capacity within 80% to 160% of the bar strength; accuracy within 2% of actual tensioning force.

.7 Assemble stressing head and bearing plate concentrically with anchor bar within plus or minus 10 mm, and not more than S degrees from the bar axis.

.8 Ensure that the free anchor length is ice free before stressing.

.9 During stressing, take adequate precautions to protect personnel and property from injury and damage due to failure of the bar or the stressing equipment. Post notices stating "DANGER - Tensioning in Progress".

3.3 INSTALLATION

.1 Drill holes at least 40mm larger than the bar diameter. Clean thoroughly by air or water jet.

.2 Install bars with grout and de-air tubes securely attached.

.3 Mortar the drill hole opening.

.4 Pump grout through grout tube until continuous flow of grout is coming out of the de-air tube.

.5 Install bars as directed by manufacturer instructions.

3.4 GROUT MIXING

.1 Provide water free of deleterious materials.

.2 Add water to mixer before cement.

.3 Mix for 3 minutes minimum, with high speed mixer (1000 rpm minimum), or paddle mixer (150 rpm minimum).

.4 Provide holding tank with paddle mixer.

.5 Inject grout within initial setting time.

3.5 INSTALLATIONS

.1 Test compressive strength of grout using 50mm cube specimens in accordance with CAN/CSA-A23.2-6B-09 (See A23.2-09).

.2 Obtain samples for testing from each different batch of grout, from the grout tube.

3.6 TESTING

.1 Proof test 50% of installed dowels with a Test Load of 70kN per dowel

3.7 MANUFACTURER SPECIFICATIONS

.1 Keep a manual of manufacturers' specifications and installation procedures at the work site.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for the supply and installation of all parts embedded in cast-in-place concrete including anchors unless specifically noted otherwise; other metal fabrications as described by the drawings and specification;

.2 The work includes but is not necessarily limited to the supply and installation of:

- .1 Stoplog sills
- .2 Stoplog gains
- .3 Stainless steel angle with cast in place shear studs edging stoplog gains
- .4 Aluminum Stoplog gain covers
- .5 Davit and embedded parts
- .6 Steel plate storage box
- .7 Log lifter rails and accessories
- .8 Railings and gates
- .9 Bollards
- .10 Fall arrest anchors
- .11 Jacking Brackets
- .12 Log Pinning Mechanisms
- .13 Steel Half Logs
- .14 Stainless steel pier nosing with cast in place shear studs

1.2 RELATED SECTION

.1 Section 03 30 00 - Cast In Place Concrete.

1.3 REFERENCE

.1 ASTM International

- .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A276/A276M-16a, Standard Specification for Stainless Steel Bars and Shapes.
- .3 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .4 ASTM A480/A480M - 16a Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
- .5 ASTM A780-09, Standard Practice for Repair of Damaged and uncoated Areas of Hot-Dip Galvanized Coatings.
- .6 ASTM A603-98(2009) e1, Standard Specification for Zinc-Coated steel Structural wire rope.
- .7 ASTM A492-95(2009), Standard Specification for stainless steel rope wire.

.2 Canadian General Standards Board (CGSB) CGSB l-GP-lBlM-99 Coating, Zinc-Rich, Organic, Ready Mixed.

.3 CSA International
- .1 CSA G40.20-04(R2009)/G40.21-04(R2009),General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA S16-14, Design of Steel Structures.
- .3 CSA W48-06 (R2011), Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .4 CSA W59-13, Welded Steel Construction (Metal Arc Welding) Metric.
- .5 CSA W59.2-M1991(R2013), Welded Aluminum Construction.
- .6 CSA G4.00(R2006), Steel Wire Rope for General Purpose and for Mine Hoisting And Mine Haulage.

.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.5 American Welding Society
- .1 AWS D1.6/D1.6M, Structural Welding Code Stainless Steel.

.6 Society for Protective Coatings (SSPC)
- .1 SSPC SP10/NACE No 2, Near-White Blast Clearing.
- .2 SSPC PA2, Procedure for Determining Compliance to Dry Coating Thickness Requirements.

1.4 ACTION AND INFORMATIONAL SUMBITTAL

.1 Submit in accordance with Section 01 33 00

.2 Shop Drawings:
- .1 Submit drawings in accordance with Section 01 33 00.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.5 MEASUREMENT AND PAYMENT

.1 In accordance with Section 01 22 01 –Measurement and Payment

.2 Payment for Railings, gates and stairs shall be included in the Lump Sum Prices.

.3 Payment for the steel half stoplogs, log pinning mechanisms, stoplog sills, gain covers, davit sockets, bollards and steel plate storage boxes

will be paid per unit installed.

.4 Payment for the Davit crane will be paid out for the supply delivery of the Davit.

.5 Payment for the ASCE 60lb Rails will be paid out per linear meter of rail installed and adjusted to permissible tolerances.

.6 Payment for the jacking pins will be payed per set of two (2) pins installed.

.7 Payment for the supply and installation of steel nosing on piers, complete with Nelson studs, shall be paid out per pier once steel nosing has been installed and approved.

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, indoors, in dry location and in accordance with manufacturer's recommendations.
.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 or 350W, unless noted otherwise.

.2 Stainless steel sections and plates: to ASTM A480, Grade 304L or 316L, unless noted otherwise.

.3 Aluminum sections and bars: Grade 6061 or 6063.

.4 Welding materials: to CSA W59, W59.2 and AWS D1.6/D1.6M.

.5 Welding electrodes: to CSA W48 Series.

.6 Bolts and anchor bolts: to ASTM A307.

.7 Zinc primer: zinc rich, ready mix to CGSB l-GP-181M.

.8 PVC coated wire strand rope: to ASTM A603-98.

2.2 FABRICATION

.1 Prepare shop drawings in accordance with Section 01 33 00.

.2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 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/m^2, Coating Grade 85, to ASTM A123/A123M.

.1 Touch-up primer for galvanized coating SPCC 20 Type I inorganic zinc rich.

.2 Embedded gains and sills to be painted on surfaces to be left exposed only if not in stainless steel.

.3 Stainless steel pier nosing to have a rough and dull finish 1D per ASTM A480.

.4 All other steel elements (other than stainless steel and painted steel) to be hot dipped galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 ERECTION

.1 Do welding work in accordance with CSA W59, W59.2 or AWS D1.6/D1.6M unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

The various elements shall be securely fixed and adequately braced to ensure precise location and to avoid any warpage, misalignment or deformation during erection.

.3 Exposed fastening devices to match finish and be compatible with material through which they pass.

.4 Supply components for work by other trades in accordance with shop drawings and schedule.

.5 Deliver items over for casting into concrete together with setting templates to appropriate location and construction personnel.

.6 Touch-up scratched galvanized surfaces with zinc primer where damaged.

.7 The required location of cast-in-place or post-installed concrete anchors shall be determined precisely, using templates as necessary. Preparation of holes and installation of post-installed anchors shall comply with the instructions provided by the manufacturer of the anchors.

3.3 Surface Preparation and Painting

.1 Surface preparation

.1 Rough textured welds and sharp edges shall be blended out with a grinder and weld spatter removed.

.2 Surface shall undergo abrasive blasting in accordance with SP10 standard by SSPC. The surface shall be inspected as required in visual inspection standard SP10 by SSPC-vis-1.

.3 All equipment, components, and surfaces that need not be cleaned and prepared for painting shall nevertheless be adequately protected against damage during cleaning operations.

.4 The Contractor shall use an abrasive that will yield the surface depth profile recommended by the paint manufacturer.

.5 The use of abrasive silica is not acceptable.

.2 Painting Application

.1 After preparation, the surface shall be coated with at least two (2) coats of high coverage epoxy paint. The paint product shall be Interseal 670HS by International or Amercoat 385 by Ameron, or an equivalent approved by the Departmental Representative.

.2 Generally, the colour of painted equipment shall be grey, code 16376 of the American FED-STD-595C standard.

.3 The application and drying period for each coat of paint shall comply with the paint manufacturer instructions. All coats of paint in a

given protection system shall originate from the same manufacturer. Minimum dry coat thickness shall be 125 microns per coat.

.4 The application method shall ensure even distribution of the paint and prevent excessive build-up and drippings.

.5 Instrument calibration, the measurement of dry coats and the acceptance criteria shall be carried out or managed in accordance with the SSPC-PA2 standard.

.6 All the equipment, components and surfaces that need not be painted shall be adequately protected to prevent being covered during paint application.

.3 Paint Touch-up

.1 Any paint touch-up shall be performed using the same paint system and to the requirements of this specification, except with respect to surface preparation and visual inspection. Surfaces shall be prepared using mechanical tools as required in SSPC-SP3 and visual inspection carried out to the applicable section of ST3 and SSPC-Vis-1.

.4 Inspection

.1 Inspection of surface preparation shall be performed immediately before paint application.

.2 The thickness of each coat of paint shall be measured during application to ensure required wet coating, followed by a verification of the dry coat after application.

3.4 GAINS, RAILINGS, TRACKS .1 Install gains, gain covers, railings, and lifter tracks in locations as indicated.

3.5 PROTECTION .1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

PART 1 – GENERAL

1.1 DESCRIPTION

.1 This section outlines the material and construction required to meet the minimum standards for the manufacturing and delivery of fabricated stoplogs for the control of water in Dams and Locks on the Trent-Severn Waterway.

1.2 RELATED SECTIONS

.1 Standard drawing, PCA-TSW-T-37-101.3M - Typical Stoplog and Lifting Bolt Detail Standard Stoplog.

1.3 MEASUREMENT AND PAYMENT

.1 Measurement Procedures: in accordance with Section 01 22 01 the New Timber Stoplog item will be paid per each stoplog delivered to the site.

.2 The Unit Price will be for all labour, material and equipment necessary to manufacture and deliver each stoplog as identified in the Contract Documents, Standards and Drawings.

.3 The Unit Price includes any double handling of material during the manufacturing or delivery of the stoplogs outlined in the Contract Documents.

.4 The Unit Price includes the removal of a stoplog identified by the Departmental Representative for replacement, delivery to and unloading at the PCA Haliburton Shop on Paradise Cove Road

1.4 REFERENCES

.1 ASTM International

.1 ASTM A123/A123M-[09], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.2 ASTM A653/A653M-[11], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.

.3 ASTM D1761-[06], Standard Test Methods for Mechanical Fasteners in Wood.

.2 CSA International

.1 CSA O112.9-[10], Evaluation of Adhesives for Structural Wood Products (Exterior Exposure)

.2 CSA O141-[05(R2009)], Softwood Lumber.

.3 CAN/CSA-Z809-[08], Sustainable Forest Management.

.3 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.

.4 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber [2010]

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-[A2011], Architectural Coatings
.2 SCAQMD Rule 1168-[A2005], Adhesives and Sealants Applications

.6 Sustainable Forestry Initiative (SFI)
.1 SFI-[2010-2014] Standard

.7 The Truss Plate Institute of Canada
.1 Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses [2007]

.8 West Coast Lumber Inspection Bureau (WCLIB)
.1 Standard 17 Grading Rules for West Coast Lumber [2004]

.9 Western Wood Product Association (WWPA)
.1 Western Lumber Grading Rules [2011]

1.5 SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data
.1 Submit manufacturer's instructions, printed product literature and data sheets for all materials and include product characteristics, performance criteria, grade sheets, shipping documents, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

1.6 QUALITY ASSURANCE

.1 All lumber is to be stamped showing grading agencies authorized by the Canadian Lumber Standards Accreditation Board (C.L.S.A.B.) or the American Lumber Standard Committee (A.L.S.C.).

.2 All steel to be all stock mild steel meeting the Canadian Standards Association (CSA) on Cold-Formed Steel Structural Members and/or the American Iron and Steel Institute (AISI) Specifications for the Design of Cold-Formed Steel Structural Members and the American National Standards Institute (ANSI) and/or American Society for Testing and Materials (ASTM).

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.2 Storage and Handling Requirements:
.1 Store materials off ground off in dry location and in accordance with manufacturer's recommendations in clean, dry, area.
.2 Store and protect wood from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.3 Delivery Requirements:
.1 Give at least 48 hours notice to the Departmental Representative prior to delivery to any consigned delivery destination.
.2 Shipping shall be consigned F.O.B. destination including all delivery charges to the designated delivery destination and shall include special delivery instructions outlined in the Contract Documents. Prices shall include shipping and H.S.T.
.3 The carrier must be equipped to unload the timber independently at the consigned delivery destination when noted elsewhere in the Contract Documents. Parks Canada will not accept delivery until all delivery conditions are met.
.4 Delivery to consigned storage areas require the timber bundles to be spaced and separated to allow the use of lifting equipment after delivery. The maximum lifting capacity of equipment is 3.855 Tonnes (8,500 lbs) at 600mm (2 ft) center.
.5 All timber to be enclosed with a waterproof covering while in transport to the consigned delivery destination or any interim storage/manufacturing facility. Contractor is responsible to supply waterproof covering for timber bundles once at point of destination or consigned storage facility.
.6 All items shall have or exceed minimum moisture content of 20% at the time of delivery to consignee. Subject to testing and acceptance by consignee at destination.
.7 Ends of timber to be painted prior to being shipped from the manufacturer to prevent checking. Subject to inspection and acceptance by consignee at destination.
.8 Subject to inspection and acceptance by consignee at destination. All Stoplogs will be inspected by Departmental Representative and must meet or exceed the specified grade and conditions of the Contract prior to delivery acceptance. Any additional costs resulting from material deemed unacceptable by the Departmental Representative by not meeting the conditions set out in this Contract will be borne solely by the Contractor.

PART 2 – PRODUCTS

2.1 STOPLOG TIMBER

.1 Timber originating from Canada, the following standard grading rules apply:
.1 Grade to be "Select Structural" in accordance with the Standard Grading Rules for Canadian Lumber (N.L.G.A. 2010) Section 5, Paragraph 130 and 130a, all to rough lumber, full sawn, paragraph 711, rough with no wane.
.1 In addition, rate of growth to be "Dense Material". For the purpose of this specification, "Dense Material" is defined as averaging 6 or more annual rings per inch and, in addition, 1/3 or more summerwood on either one end or the other of a piece, measured as described in Paragraph 350c. The contrast in colour between summerwood and springwood must be distinct. Pieces averaging less than 6 annual rings per inch but not less than 4 are accepted as dense if averaging ½ or more summerwood.
.2 All lumber supplied is to be stamped showing the grade, species and grading agency, authorized by the Canadian Lumber Standards Administrative Board.

.2 Timber originating from the United States, the following standard grading rules apply:
.1 West Coast Lumber Inspection Bureau (W.C.L.I.B. 2004, rule #17) "Select Structural" in accordance with Section 5, Paragraph 130 and 130a, all to rough lumber, full sawn paragraph 250 and 250a and/or;
.2 Western Wood Product Association (W.W.P.A. 2011) "Select Structural" in accordance with Section 10, Paragraph 70.00 and 70.10, all to rough lumber, full-sawn Paragraph 3.20.

2.2 LIFTING BOLT STEEL

.1 Steel to be in conformance with the requirements set out in the latest edition of the following standards:
.1 Structural Steel and Miscellaneous Metals;
.1 CSA G40.20-04/CSA G40.21-04; Or
.2 ASTM A36

.2 Welding to be in conformance with the requirements set out in the latest edition of the following standards:
.1 Welded Steel Construction (Metal Arc Welding);
.1 CSA W59; Or
.2 AWS D1.1

2.3 HARDWARE

.1 Hardware to be in conformance with the requirements set out in the latest edition of the following standards:
.1 High Strength Bolts, Nuts and Washers;
.1 ASTM A325 BOLTS
.2 ASTM A563 NUTS.

2.3 SPECIAL AGREEMENTS

.1 All lumber receive must meet or exceed the specified grade and conditions of the contract. Any additional shipping costs due to below grade lumber being replaced will be borne by the shipper.

.2 Re-inspection 40;
.1 The NLGA Standard Grading Rule Section Re-inspection 400i shall be modified so that "Each item shall be considered as the grade or size as specified in the shipment if not more than 5% is below grade." is replace with "Each item shall be considered as the grade or size as specified in the shipment if none is below grade."

.3 Re-inspection 400J;
The NLGA Standard Grading Rule Section Re-inspection 400J shall be modified so that "Shipment shall be considered as of the moisture content as specified for the shipment, if not more than 5% of the FBM (volume) exceed the allowable moisture content." is replace with "Shipment shall be considered as of the moisture content as specified for the shipment, if all of the FBM (volume) meet or exceed the allowable moisture content."

.4 Re-inspection 400K;
.1 The NLGA Section Re-inspection 400K shall be modified so that "The contractual obligation of the seller shall be deemed to have been fulfilled if each item of a shipment shall upon re-inspection to be found to be 95% or more of said grade or better." is replaced by "The contractual obligation of the seller shall be deemed to have been fulfilled if each item of a shipment shall upon re-inspection to be found to be **all** of said grade or better."

.5 Re-inspection 400N;
.1 The NLGA Section Re-inspection 400N shall be modified so that "The expense of such re-inspection shall be borne by the shipper if the item under complaint is found to be more than 5% below grade; if 5% or less, the expense of re-inspection shall be borne by the buyer. If more than one item is under complaint, the expense of re-inspection shall be pro-rated....to those found to be 5% or less below grade." is replaced by "The expense of such re-inspection shall be borne by the shipper whether or not the item under complaint is found to be more or less than 5% below grade. If more than one item is under complaint, the expense of re-inspection shall be borne by the shipper."

PART 3 – EXECUTION

3.1 STOPLOG FABRICATION

.1 Fabricate the specified number of timber stoplogs to the following dimensions:
356mm (W) x 305mm (H) x 6,650mm (L)

.2 Timber beams to be manufactured to the dimensions scheduled in the contract documents. Timber beams to be manufactured for the installation of a Stoplog Lifting Bolt at each end in accordance with standard drawing, PCA-TSW-T-37-101.3M - Typical Stoplog and Lifting Bolt Detail Standard Stoplog.

.3 Fabricate Stoplog Lifting Bolt in accordance with standard drawing, PCA-TSW-T-37-101.3M - Typical Stoplog and Lifting Bolt Detail Standard Stoplog, adjusting the overall length through the center section to be installed into varied nominal timber sizes outlined above. Thread length, width of the lifting bolt and distance from the welded washer(s) to the outer dimension of the bend to conform to the standard drawing. The Stoplog Lifting Bolt shall not be less than 25mm (1 in.) in nominal height than the timber beam it is to be installed. Lifting bolts to be Hot-dip Galvanised.

.4 Install Stoplog Lifting Bolt in accordance with the standard drawing, PCA-TSW-T-37-101.3M - Typical Stoplog and Lifting Bolt Detail Standard Stoplog. Stoplog Lifting Bolt shall not extend beyond the plane of the top or bottom of the timber beam when installation is complete.

.5 Align and plumb faces of Stoplog Lifting Bolt with the end of the Timber at the distance specified in standard drawing, PCA-TSW-T-37-101.3M - Typical Stoplog and Lifting Bolt Detail Standard Stoplog.

.6 Install Stoplog Lifting Bolt centered in the timber beam at the required distance from the finished end of the timber. Once placed into timber beam the Stoplog Lifting Bolt fasteners to be tightened a single half-turn after hand-tightened. A Stoplog lifting Bolt is required at each end of the timber beam.

.7 Both ends of timber beam and removed portions of the timber beam for the installation of the Stoplog Lifting Bolts to be painted or wax coated prior to Stoplog Lifting Bolt installation to prevent checking.

3.5 INSTALLATION

.1 Installation of the stoplogs and operations of the sluices shall be performed by Authorized Parks Canada Employees only.

3.6 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: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Divert packaging materials from landfill to appropriate recycling facilities.
.2 Divert unused metal materials from landfill to metal recycling facility.
.3 Divert unused caulking, sealants, and adhesive materials from landfill to official hazardous material collections site.
.4 Do not dispose of unused caulking, sealants, and adhesive materials into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.
.5 Divert waste wood products from landfill to appropriate wood recycling facility.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 24 13 –Roadway Embankments

.2 Section 31 23 33.01 –Excavating, Trenching and Backfilling

.3 Section 31 32 19.01 -Geotextiles

.4 Section 32 91 19 13 Topsoil Placement and Grading

1.2 MEASUREMENT AND PAYMENT

.1 Measurement Procedures: in accordance with Section 01 22 01, the Items Backfill Material, Granular A, and Granular B will be paid per cubic meter.

.2 The Unit Price will be for all labour, material and equipment necessary to supply, deliver, and place all aggregate materials as identified in the Contract Documents, Standards and Drawings. The Unit Bid Price includes any double handling of material during the manufacturing or delivery of the aggregate materials outlined in the Contract Documents.

1.3 REFERENCES

.1 ASTM International
.1 ASTM D4791-[10], Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit 3 samples.
.2 Allow continual sampling by Departmental Representative during production.
.3 Provide Departmental Representative with access to source and processed material for

sampling.
.4 Supply new or clean sample bags or containers according appropriate to aggregate materials.
.5 Pay cost of aggregates which fail to meet specified requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
.1 Greatest dimension to exceed 5 times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
.1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
.2 Reclaimed asphalt pavement.
.3 Reclaimed concrete material.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
.1 Crushed rock.
.2 Gravel [and crushed gravel] composed of naturally formed particles of stone.
.3 Light weight aggregate, including slag and expanded shale.
.4 Reclaimed asphalt pavement.
.5 Reclaimed concrete material.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for

sampling 2 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative 2 weeks minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Processing:
.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
.2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.

.1 Use methods and equipment approved in writing by Departmental Representative.

.2 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
.1 Use only equipment approved in writing by Departmental Representative.

.3 Stockpiling:
.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.
.2 Stockpile aggregates in sufficient quantities to meet project schedules.
.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
.5 Surround all stockpiled materials with reptile and amphibian exclusion fencing in accordance with Section 01 35 43.

.6 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
.7 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.
.8 Stockpile materials in uniform layers of thickness as follows:
.1 Maximum 1.5 m for coarse aggregate and base course materials.
.2 Maximum 1.5 m for fine aggregate and sub-base materials.
.3 Maximum 1.5 m for other materials.
.9 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
.10 Do not cone piles or spill material over edges of piles.
.11 Do not use conveying stackers.
.12 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 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 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

.5 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.6 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

.7 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS — Not used.

1.2 MEASUREMENT PROCEDURES

.1 In accordance with Section 01 22 01 –Measurement and Payment

.2 There will be no measurement of work included in this Section.

.3 Payment shall be included in the Lump Sum Price for General Site Work.

1.3 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.

1.4 DEFINITIONS

.1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and 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 disposing of fallen timber and surface debris.

.3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.4 Underbrush clearing consists of removal from treed areas of undergrowth and deadwood, and disposing of fallen timber and surface debris.

.5 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

1.5 ACTION AND INFORMATION SUBMITTALS

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

.2 Samples:
.1 Submit 1 samples of each 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 Herbicide: 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.

1.6 QUALITY ASSURANCE

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

.2 Safety Requirements: worker protection.
.1 Workers must wear gloves, respirators, dust masks, long sleeved clothing, eye protection and protective clothing when applying herbicide materials.
.2 Workers must not eat, drink or smoke while applying herbicide material.
.3 Clean up spills of preservative materials immediately with absorbent material and safely discard to landfill.

1.7 STORAGE AND PROTECTION

.1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, 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.

1.8 WASTE MANAGEMENT AND DISPOSAL

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

.2 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as saleable timber.
.1 Trim limbs and tops, and saw into saleable lengths.
.2 Stockpile adjacent to site.

PART 2 - PRODUCTS

2.1 MATERIALS

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

.2 Herbicide: effective for killing annual and perennial weeds, and bamboo grass, by being absorbed through roots and foliage.
.1 Spray applied on non-crop land areas.
.2 Type as approved by Departmental Representative

.3 Soil Material for Fill:
.1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
.2 Remove and store soil material for reused.

PART 3 - EXECUTION

3.1 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.
.2 When utility lines which are to be removed are encountered within area of operations, notify Departmental Representative in ample time to minimize interruption of service.

.3 Notify utility authorities before starting clearing and grubbing.

.4 Keep roads and walks free of dirt and debris.

.5 Confirm timing for clearing and grubbing is acceptable to Departmental Representative and is in accordance with Sections 01 35 43 –Environmental Procedures and 01 14 00 –Work Restrictions.

3.2 APPLICATION

.1 Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation

instructions, and datasheet.

3.3 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, and rubbish occurring within cleared areas.

.2 Clear as directed by Departmental Representative, by 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.

.3 Cut off branches overhanging area cleared as directed by Departmental Representative.

.4 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

.5 Apply herbicide [in accordance with manufacturer's label to top surface of stumps designated not to be removed.

3.4 ISOLATED TREES

.1 Cut off isolated trees as directed by Departmental Representative at height of not more than 300 mm above ground surface.

.2 Grub out isolated tree stumps.

.3 Prune individual trees as indicated.

.4 Trim trees designated to be left standing within cleared areas of dead branches 4 cm or more in diameter; and trim branches to heights as indicated.

.5 Cut limbs and branches to be trimmed close to bole of tree or main branches.

.6 Paint cuts more than 3 cm in diameter with approved tree wound paint.

3.5 UNDERBRUSH CLEARING

.1 Clear underbrush from areas as directed by Departmental Representative to within 100 mm of ground surface].

3.6 GRUBBING

.1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.

.2 Grub out stumps and roots to not less than 200 mm below ground surface.

.3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 1.00 m3.

.4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground

3.7 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials off site to disposal area designated by Departmental Representative.

.2 Cut timber greater than 125 mm diameter to lengths and stockpile as indicated. Stockpiled timber becomes property of Departmental Representative.

.3 Mulch and spread cleared and grubbed vegetative material on site as directed by Departmental Representative.

.4 Remove diseased trees identified by Departmental Representative and dispose of this material to approval of Departmental Representative.

3.8 FINISHED SURFACE

.1 Leave ground surface in condition suitable for stripping of topsoil to the approval of Departmental Representative.

3.9 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

PART 1 - GENERAL

1.1 PRICE AND PAYMENT PROCEDURES

.1 In accordance with Section 01 22 01 –Measurement and Payment

.2 There will be no measurement of work included in this Section.

.3 Payment shall be included in the Lump Sum Prices for General Site Work.

1.2 REFERENCES

.1 Definitions:
.1 Rock: any solid material in excess of 1.00 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.

1.3 ACTION AND INFORMATION SUMBITTAL

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

.2 Blasting Submittals (if required): submit for approval, written proposal of operations for removal of rock by blasting to Departmental Representative.
.1 Indicate proposed method of carrying out work, types and quantities of explosives to be used, loading charts and drill hole patterns, type of caps, blasting techniques, blast protection measures for items such as flying rock, vibration, dust and noise control. Include details on protective measures, time of blasting and other pertinent details.
.2 Submit records to Departmental Representative at end of each shift. Maintain complete and accurate record of drilling and blasting operations.

.3 Sustainable Standards Certification:
.1 Erosion and Sedimentation Control: submit copy of Erosion and Sedimentation Control Plan for project highlighting implementation measures.

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

1.4 DELIVERY STORAGE AND HANDLING

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

Packaging Waste Management: remove for recycling packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Not used.

PART 3 - EXECUTION

3.1 ROCK REMOVAL

.1 Perform excavation in accordance with Erosion and Sedimentation Control Plan.

.2 Co-ordinate this Section with Section [01 35 29.06 - Health and Safety Requirements].

.3 Remove rock to alignments, profiles, and cross sections as indicated.

.4 Explosive blasting is not permitted unless absolutely required to achieve project goals and only with prior approval of Departmental Representative and in accordance with DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.

.5 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.6 Excavate rock to horizontal surfaces with slope not to exceed 1:10.

.7 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.

.8 Excavate trenches to lines and grades to minimum of 100 mm below pipe invert indicated. Provide recesses for bell and spigot pipe to ensure bearing will occur uniformly along barrel of pipe.

.9 Cut trenches to widths as indicated.

.10 Remove boulders and fragments which may slide or roll into excavated areas.

.11 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 -Excavating, Trenching and Backfilling.

3.2 CLEANING

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

.2 Rock Disposal:
.1 Dispose of surplus removed rock off site in accordance with Section 01 74 21 - Construction/demolition Waste Management and Disposal.
.2 Do not dispose removed rock into landfill. Send material to appropriate location as approved by Departmental Representative.

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

3.3 PROTECTION

.1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 41 16 –Structure Demolition

.2 Section 02 41 21 –Removals

.3 Section 31 05 16 –Aggregate Materials

.4 Section 31 23 16.26 –Rock Removal

.5 Section 31 24 13 –Roadway Embankments

.6 Section 31 32 19.01 –Geotextiles

.7 Section 35 20 22 –Dewatering

1.2 MEASURAMENT PROCEDURES

.1 In accordance with Section 01 22 01 –Measurement and Payment

.2 There will be no measurement of work included in this Section.

.3 Payment shall be included in the Lump Sum Prices for General Site Work as well as in the cost of removal of the existing dam.

1.3 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).
.6 ASTM D4318-[05], Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.

.3 Canada Green Building Council (CaGBC)
.1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).

.4 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.

.5 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.

1.4 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 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.
.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Topsoil:
.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.7 Unsuitable materials:
.1 Weak, chemically unstable, and compressible materials.
.2 Frost susceptible materials:
.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422: Sieve sizes to CAN/CGSB-8.1.
.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 10
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

.8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality Control:
.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
.2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
.3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
.4 Submit to Departmental Representative written notice when bottom of excavation is reached.
.5 Submit to Departmental Representative testing and inspection results 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: location plan of existing utilities as found in field, clearance record from utility authority, location plan of relocated and abandoned services, as required.

.4 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Inform Departmental Representative at least 2 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 including representative samples of excavated material.
.4 Ship samples to Departmental Representative, in tightly closed containers, to prevent contamination and exposure to elements.
.5 At least 2 weeks prior to beginning Work, inform Departmental Representative of source of fly ash and submit samples to Departmental Representative.
.1 Do not change source of Fly Ash without written approval of Departmental Representative.

1.6 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Where Departmental Representative is employee of Contractor, submit proof that Work by Departmental Representative is included in Contractor's insurance coverage.

.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 Province of Ontario, Canada.

.5 Keep design and supporting data on site.

.6 Engage services of qualified professional Engineer who is registered or licensed in Province of Ontario, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.7 Do not use soil material until written report of soil test results are approved by Departmental Representative.

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

1.7 WASTE MANAGEMENT AND DISPOSAL

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

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

1.8 EXISTING CONDITIONS

.1 Examine geotechnical report.

.2 Buried services:
.1 Before commencing work establish 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 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
.5 Prior to beginning excavation Work, notify applicable Departmental Representative and authorities having jurisdiction, establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
.6 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods.
.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
.8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before re-routing. Costs for such Work to be paid by Contractor.
.9 Record location of maintained, re-routed and abandoned underground lines.
.10 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing buildings and surface features:
.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
.3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
.1 Crushed, pit run or screened stone, gravel or sand.
.2 Gradations to be within limits specified when tested to [ASTM C136]. Sieve sizes to [CAN/CGSB-8.1].
.3 Table:

Sieve Designation	% Passing	
Type 1	Type 2	
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

.2 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.3 Unshrinkable fill: proportioned and mixed to provide:
.1 Maximum compressive strength of 0.4 MPa at 28 days.
.2 Maximum cement content of 25 kg/m^3 with 40% by volume fly ash replacement: to CSA-A3001, Type GU.

.3 Minimum strength of 0.07MPa at 24 h.
.4 Concrete aggregates: to CSA-A23.1/A23.2.
.5 Cement: Type GU.
.6 Slump: 160 to 200 mm.

.4 Shearmat (if required): honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.

.5 Geotextiles: to Section 31 32 19.01 - Geotextiles.

PART 3 - EXECUTION

3.1 SITE PREPARATION

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

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 PREPARATION/PROTECTION

.1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are required to remain undisturbed.

3.3 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as indicated after area has been cleared of brush and removed from site.

.2 Strip topsoil to depths as directed by Departmental Representative.
.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by Departmental Representative.
.1 Stockpile height not to exceed 2 m and should

be protected from erosion.

.4 Dispose of unused topsoil off site as directed by Departmental Representative.

3.4 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 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

.4 Surround all stockpiled materials with reptile and amphibian exclusion fencing in accordance with Section 01 35 43.

3.5 COFFERDAMS, SHORING, BRACING AND UNDERPIPPING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and Health and Safety Act for the Province of Ontario.
.1 Where conditions are unstable, Departmental Representative to verify and advise methods.

.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.3 Construct temporary Works to depths, heights and locations as indicated and approved by Departmental Representative.

.4 During backfill operation:
.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
.2 Do not remove bracing until backfilling has reached respective levels of such bracing.
.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:
.1 Remove cofferdams, shoring and bracing.
.2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.6 DEWATERING AND HEAVE PREVENTION

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

.2 Provide for Departmental Representative approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water 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.

3.7 EXCAVATION

.1 Advise 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.

.3 Remove concrete, masonry, paving, walks, demolished foundations, rubble and other obstructions encountered during excavation in accordance with Section 02 41 16 - Structure Demolition.

.4 Excavation must not interfere with bearing capacity of adjacent foundations.

.5 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.

.6 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of

installation operations and do not leave open more than 15 m at end of day's operation.

.7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.8 Restrict vehicle operations directly adjacent to open trenches.

.9 Dispose of surplus and unsuitable excavated material in approved location.

.10 Do not obstruct flow of surface drainage or natural watercourses.

.11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.12 Notify Departmental Representative when bottom of excavation is reached.

.13 Obtain Departmental Representative approval of completed excavation.

.14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.15 Correct unauthorized over-excavation as follows:
.1 Fill under bearing surfaces and footings with concrete specified for footings.
.2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

.16 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 Departmental Representative.

.17 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

3.8 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698.
.1 Exterior side of perimeter walls: use Type 3

fill to subgrade level. Compact to 95% of corrected maximum dry density.
.2 Within building area: use Type 2 to underside of base course for floor slabs. Compact to 100 % of corrected maximum dry density.
.3 Under concrete slabs: provide 150 mm compacted thickness base course of Type 1 fill topped with shearmat filler as indicated to underside of slab. Compact base course to 100%.
.4 Retaining walls: use Type 2 fill on high side for minimum 500 mm from wall and compact to 95 %. For remaining portion, use Type 3 fill compacted to 95 %.
.5 Place unshrinkable fill in areas as indicated.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated.

.2 Place bedding and surround material in unfrozen condition.

3.10 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:
.1 Departmental Representative has inspected and approved installations.
.2 Departmental Representative has inspected and approved of construction below finish grade.
.3 Inspection, testing, approval, and recording location of underground utilities.
.4 Removal of concrete formwork.
.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:
.1 Place bedding and surround material as specified elsewhere.
.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1 m.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:

.2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

.6 Place unshrinkable fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

.8 Install drainage system in backfill as indicated.

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 Departmental Representative.

.2 Replace topsoil as directed by Departmental Representative in accordance to Section 32 91 19.13 - Topsoil Placement and Grading.

.3 Reinstate natural ground to elevation which existed before excavation unless otherwise indicated or directed by Departmental Representative.

.4 Reinstate pavements disturbed by excavation to thickness, structure and elevation which existed before excavation.

.5 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 16.26 –Rock Removal

.2 Section 31 23 33.01 –Excavating, Trenching and Backfilling

.3 Section 31 32 19.01 –Geotextiles

.4 Section 32 91 19.13 –Topsoil Placement

.5 Section 32 92 19.16 –Hydraulic Seeding

1.2 MEASUREMENT PROCEDURES

.1 In accordance with Section 01 22 01 –Measurement and Payment

.2 There will be no measurement of work included in this Section.

.3 Payment shall be included in the Lump Sum Price for General Site Work.

1.3 REFERENCES

.1 Definitions:

.1 Rock Excavation: excavation of:

.1 Material from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort with a Caterpillar D9 crawler bulldozer or equivalent to be considered integral with parent mass.

.2 Boulder or rock fragments measuring in volume 1 cubic meter or more.

.2 Common Excavation: excavation of materials that are not Rock Excavation or Stripping.

.3 Unclassified Excavation: excavation of whatever character other than stripping encountered in the Work.

.4 Free Haul: distance that excavated material is hauled without compensation. Free haul distance t0.5 km or less.

.5 Stripping: excavation of organic material covering original ground.

.6 Over Haul: authorized hauling in excess of free haul distance that excavated material is moved.

.7 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.

.8 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.

.9 Borrow Material: material obtained from areas outside right-of-way and required for construction of embankments or for other portions of work.

.10 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Reference Standards:
.1 ASTM International
.1 ASTM D698-07ea1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft3) (600 kN-m/m3).
.2 American Association of State Highway and Transportation Officials (AASHTO)
.1 AASHTO T99-10, Standard Method of test for Moisture-Density Relations of Soils Using a 2.5 kg (5.5lb) Rammer and 305 mm (12 in) Drop.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit for approval and review blasting program including preshear details, powder factors fly-rock control, and vibration monitoring methods.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Adhere to regulations of authority having jurisdiction when blasting is required.
.2 Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Embankment materials require approval by Departmental Representative.

.2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or other unsuitable material.

.3 Borrow material:
.1 Obtain from sources such as quarry, or borrow pit as approved by Departmental Representative.

.1 Earth Embankment materials to consist of acceptable earth material and processed rock material free from objectionable quantities of organic matter, frozen soil, stumps, trees, moss, and other unsuitable materials.
.2 Rock Embankment material to consist of

fragmented rock produced by drilling and blasting operations, and boulders which cannot be placed in layers as specified for Earth Embankments.

.1 Rock Embankment to conform to gradation as follows:

Sieve Designation	Percent Passing by Weight
150 mm	100
100 mm	85 - 100
75 mm	10 - 50
No. 200	* 0 - 3

.2 *Gradation is determined by that portion passing 75 mm screen.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 COMPACTION EQUIPMENT

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

.2 Operate compaction equipment continuously in each embankment when placing material.

3.3 WATER DISTRIBUTORS

.1 Apply water with equipment capable of uniform distribution.

3.4 STRIPPING

.1 Place top soil and finish grading in accordance with Section 32 91 19.13 - Topsoil Placement and Grading.

.2 Commence topsoil stripping of areas as indicated after brush, weeds and grasses have been removed from these areas.

.3 Strip topsoil to depths as directed by Departmental Representative. Do not mix topsoil with subsoil.

.4 Stockpile in locations as directed by Departmental Representative.
.1 Stockpile height: not to exceed 2 m.

.5 Dispose of unused topsoil off site as directed by Departmental Representative.

.6 Remove clearing and grubbing debris from stripping.

.7 Spread organic stripping, on completion of excavation and embankment construction, on slopes and trim or remove from site if quantity exceeds ability to grade on site.

3.5 EXCAVATING

.1 General:
.1 Notify Departmental Representative when waste materials are encountered and remove to depth and extent directed.
.2 Sub-excavate 500 mm below subgrade in cut sections unless otherwise directed by Departmental Representative.
.1 Compact top 150 mm below sub-excavate to minimum 95% maximum dry density, to ASTM D698.
.2 Replace with approved embankment material and compact to specified embankment density.
.3 Treat ground slopes, where subgrade is on transition from excavation to embankment, at grade points as directed by Departmental Representative.
.4 Treat ground slopes, where subgrade is on transition from excavation to embankment, at grade points as directed by Departmental Representative.

.2 Drainage:
.1 Maintain profiles, crowns and cross slopes to provide good surface drainage.
.2 Provide ditches as work progresses to provide drainage.
.3 Construct interceptor ditches as indicated or as directed before excavating or placing embankment in adjacent area.

.3 Rock excavation:
.1 Notify Departmental Representative when material appearing to conform to classification for rock is encountered, to enable measurements to be made to determine volume of rock. Provide 24 hour

notification.
.2 No blasting will be permitted.
.3 Shatter rock to 200 mm below subgrade elevation as indicated.

.4 Borrow Excavation:
.1 Completely use in embankments, suitable materials removed from right-of-way excavations before taking material from borrow areas.
.2 Obtain embankment materials, in excess of what is available from cut areas, from designated borrow areas.
.1 Departmental Representative to designate extent of borrow areas and allowable depth of excavation.
.2 Remove waste and stripping material from borrow pits to designated locations.
.3 Slope edges of borrow areas to minimum 2:1 and provide drainage as directed.
.4 Trim and leave borrow pits in condition to permit accurate measurement of material removed.

3.6 EMBANKMENTS

.1 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.
.1 Method used to be to be pre-approved in writing by Departmental Representative.

.2 Break up or scarify existing road surface prior to placing embankment material.

.3 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized by Departmental Representative.

.4 Maintain crowned surface during construction to ensure ready run-off of surface water.

.5 Drain low areas before placing materials.
.1 Place and compact to full width in layers not exceeding 200 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.

.6 Where material consists of rock:
.1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1 m.
.2 Distribute rock material to fill voids with smaller fragments to form compact mass.
.3 Fill surface voids at subgrade level with rock spalls or selected material to form earth-tight surface.

.4 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of pavement subgrade elevation.

.7 Deductions from excavation will be made for overbuild of embankments.

3.7 COMPACTION

.1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.

.2 Deposit, spread, and level, embankment material in layers 200 mm maximum thickness before compaction.
.1 Compact each layer of embankment until compaction equipment achieves no further significant consolidation.
.2 Ensure required compaction for each layer before placing any material for next layer.

.3 Use specialized compaction equipment supplemented by routing, hauling, and leveling equipment over each layer of fill.

.4 Obtain written approval from Departmental Representative before using specialized compaction equipment such as tamping rollers, vibratory rollers, or other alternate compaction equipment that produces the required results
.1 For tamping rollers, use equipment that exerts 1000 kPa minimum of pressure on tamping surface of each tamping foot in transverse row.

.5 Compact each layer to minimum 95% maximum dry density: ASTM D698 except top 150 mm of subgrade.
.1 Compact top 150 mm to 100% maximum dry density.

.6 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

3.8 FINISHING

.1 Shape entire roadbed to within 10 mm of design elevations not uniformly high or low.

.2 Finish slopes, ditch bottoms and borrow pits true to lines, grades and drawings where applicable. Scale slope by removing loose fragments, for cut slopes in bedrock steeper than 1:1.

.3 Remove rocks over 150 mm in dimension from slopes and ditch bottoms.

.4 Hand finish slopes that cannot be finished satisfactorily by machine.

.5 Round top of backslope 1.5 m both sides of top of slope.

.6 Run tractor tracks over slopes exceeding 3 m in height to leave tracks parallel to centreline of highway.

.7 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags and ruts.

3.9 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: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.10 PROTECTION

.1 Maintain finished surfaces in condition conforming to this section until acceptance by Departmental Representative.

.2 Provide silt fences, erosion protection and reptile exclusion fencing as required to mitigate and prevent impacts to the environment and the public.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1 Section 31 37 00 –Rip-Rap

.2 Section 31 05 16 -Aggregate Materials

.3 Section 31 23 33.01 –Excavating Trenching and Backfilling.

1.2 MEASURAMENT AND PAYMENT .1 In accordance with Section 01 22 01 –Measurement and Payment

.2 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

1.3 REFERENCES .1 ASTM International

.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.3 ASTM D4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.4 ASTM D4716-08, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.5 ASTM D4751-04, 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.

.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.

.4 Ontario Provincial Standard Specifications (OPSS)
.1 OPSS 1860-November 2010, Material Specification for Geotextiles.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit following samples 2 weeks prior to beginning Work.
.1 Minimum length of 2 m of roll width of geotextile.
.2 Methods of joining.

.4 Test and Evaluation Reports:
.1 Submit copies of mill test data and certificate at least 2 weeks prior to start of Work.

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 Store and protect geotextiles from direct sunlight and UV rays.
.3 Replace defective or damaged materials with new.

.3 Packaging Waste Management: remove for recycling packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Geotextile:non-woven synthetic fibre fabric, supplied in rolls.
.1 Composed of: minimum 95% by mass of polypropylene or polyester with inhibitors added to base plastic to resist deterioration by UV and heat exposure for 60 days.

.2 Physical properties:
.1 Thickness: to CAN/CGSB-148.1, No.3, minimum 3.5 mm.
.2 Tensile strength and elongation (in any principal direction): to ASTM D4595.

.1 Tensile strength: minimum 1450 N, wet condition.
.2 Elongation at break: 70 to 110%.
.3 Tear strength: minimum 600 N.

.3 Bursting strength: to CAN/CGSB-148.1, No.6.1 minimum 3500 kPa, wet condition.
.4 UV Stability: to ASTM 04355 minimum 50% tensile strength retained after 500 hours.

.3 Hydraulic properties:
.1 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10 40 – 110 µm.

.4 Securing pins and washers: to CSA G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m2to ASTM A123/A123M.

.5 Factory seams: sewn in accordance with manufacturer's recommendations.

.6 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative

3.2 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with hooks.

.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 Join successive strips of geotextile by sewing.

.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 Sections 31 23 33.01 - Excavating, Trenching and Backfilling and 31 24 13 - Roadway Embankments

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 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility

3.4 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.
.1 Replace all geotextiles traveled on with new material at the direction of the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16 –Aggregate Materials

.2 Section 31 24 13 –Roadway Embankments

.3 Section 31 32 19.01 –Geotextiles

1.2 MEASUREMENT PROCEDURES

.1 In accordance with Section 01 22 01 –Measurement and Payment

.2 Measure rip-rap without cement mortar in cubic meters of material placed.

1.3 REFERENCES

Not used.

1.4 WASTE MANAGEMENT DISPOSAL

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

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Fold up metal banding, flatten and place in designated area for recycling.

.5 Divert left over aggregate materials from landfill to local facility for reuse as approved by Departmental Representative.

.6 Divert left over geotextiles to local plastic recycling facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 STONE

.1 Hard, with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:

.1 Coarse 75-100 mm caliber rip-rap:

.1 Not more than 10% of total volume of stones with individual volume less than 10 dm^3.

.2 Not less than 50% of total volume of stones with individual volume of 8.5 dm^3 or more.
.3 Remaining percentage of total volume to have uniform distribution of stones between 7.5 and 10 dm^3 size.
.4 Supply rock spalls or cobbles to fill open joints

.2 Heavy 300-500 mm caliber rip-rap:
.1 Not more than 10% of total volume of stones with individual volume less than 30 dm^3.
.2 Not less than 50% of total volume of stones with individual volume of 40 dm^3 or more.
.3 Remaining percentage of total volume to have uniform distribution of stones between 30 and 40 dm^3 size.

2.2 CEMENT MOTAR — Not used.

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

PART 3 - EXECUTION

3.1 PLACING
.1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.

.2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.3 Place geotextile on prepared surface in accordance with Section 31 32 19.01- Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.

.4 Place rip-rap to thickness and details as indicated.

.5 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

.6 Hand placing:
.1 Use larger stones for lower courses and as headers for subsequent courses.
.2 Stagger vertical joints and fill voids with rock spalls or cobbles.
.3 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This Section includes furnishing all materials and labor required for the design and construction of a precast concrete modular block (PMB) retaining wall associated with the pedestrian walkway with or without geosynthetic reinforcement. Precast modular block retaining wall blocks under this section shall be cast utilizing a wet-cast concrete mix and exhibit a final handling weight in excess of 1,000 pounds (450 kg) per unit.

.2 Scope of Work: The work shall consist of furnishing materials, labor, equipment and supervision for the construction of a PMB retaining wall structure associated with the pedestrian walkway in accordance with the requirements of this section and in acceptable conformity with the lines, grades, design and dimensions shown in the project site plans.

.3 Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 31, Division 32 and Division 33 also apply to this Section.

1.2 RELATED SECTIONS

.1 Section 31 05 16 – Aggregate Materials;

.2 Section 31 11 00 – Clearing and Grubbing;

.3 Section 31 23 16 – Rock Removal;

.4 Section 31 23 33.01 – Excavating Trenching and Backfilling;

.5 Section 31 32 19.01 – Geotextiles;

.6 Section 31 37 00 – Rip-Rap.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 In accordance with Section 01 22 01 –Measurement and Payments,

.2 Measure precast concrete block wall by square meter of vertical wall face.

.1 The unit of measurement for furnishing the precast modular block retaining wall system shall be the vertical area of the wall face surface as measured from the top of the leveling pad to the top of the wall including coping. The final measured quantity shall include supply of all material components and the installation of the precast modular block system.

.2 The final accepted quantities of the precast

modular block retaining wall system will be compensated per the vertical face area as described above. The quantities of the precast modular block retaining wall as shown on the plans and as approved by the Departmental Representative shall be the basis for determination of the final payment quantity. Payment shall be made per square meter of vertical wall face. No separate measurement will be made for embedded reinforcing steel and other items.

.3 No allowance shall be made in the price of the retaining wall for excavation. The cost of excavation for the purposes of site access shall be the responsibility of the General Contractor. Removal of unsuitable soils and replacement with select fill shall be as directed and approved in writing by the Departmental Representative.

.3 Measure riprap in cubic metres in place as measured from drawings.

.4 Measure graded stone filter in cubic metres in place as measured from drawings.

.5 Measure granular fill in cubic metres in place as measured from drawings.

.6 Measure aggregate fill in cubic metres in place as measured from drawings.

.7 Measure geosynthetics in square metres in place as measured from drawings.

1.4 REFERENCES

.1 Where the specification and reference documents conflict, the Departmental Representative will make the final determination of the applicable document.

.2 Definitions:

.1 Precast Modular Block (PMB) Unit – machine-placed, “wet cast” concrete modular block retaining wall facing unit.

.2 Geotextile – a geosynthetic fabric manufactured for use as a separation and filtration medium between dissimilar soil materials.

.3 Geogrid – a geosynthetic material comprised of a regular network of tensile elements manufactured in a mesh-like configuration of consistent aperture openings. When connected to the PMB facing units and placed in horizontal layers in compacted fill, the geogrid prevents lateral deformation of the retaining wall face and provides effective

tensile reinforcement to the contiguous reinforced fill material.

.4 Drainage Aggregate – clean, crushed stone placed within and immediately behind the precast modular block units to facilitate drainage and reduce compaction requirements immediately adjacent to and behind the precast modular block units.

.5 Unit Core Fill – clean, crushed stone placed within the hollow vertical core of a precast modular block unit. Typically, the same material used for drainage aggregate as defined above.

.6 Foundation Zone – soil zone immediately beneath the leveling pad and the reinforced zone.

.7 Retained Zone – soil zone immediately behind the drainage aggregate and wall infill for wall sections designed as modular gravity structures. Alternatively, in the case of wall sections designed with geosynthetic soil reinforcement, the retained zone is the soil zone immediately behind the reinforced zone.

.8 Reinforced Zone – structural fill zone within which successive horizontal layers of geogrid soil reinforcement have been placed to provide stability for the retaining wall face. The reinforced zone exists only for retaining wall sections that utilize geosynthetic soil reinforcement for stability.

.9 Reinforced Fill – structural fill placed within the reinforced zone.

.10 Leveling Pad – hard, flat surface upon which the bottom course of precast modular blocks are placed. The leveling pad may be constructed with crushed stone or cast-in-place concrete. A leveling pad is not a structural footing.

.11 Wall Infill – the fill material placed and compacted between the drainage aggregate and the excavated soil face in retaining wall sections designed as modular gravity structures.

.3 Reference Standards

.1 Design

.1 AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.

.2 Minimum Design Loads for Buildings and Other Structures – ASCE/SEI 7-10.

.3 International Building Code, 2012 Edition.

.4 FHWA-NHI-10-024 Volume I and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.

.5 FHWA-NHI-10-025 Volume II and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.

.2 Precast Modular Block Units

.1 ASTM C94 – Standard Specification for Ready-Mixed Concrete.

.2 ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.

.4 ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

.5 ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

.6 ASTM C666 – Standard Test Method for Concrete Resistance to Rapid Freezing and Thawing.

.7 ASTM C920 – Standard Specification for Elastomeric Joint Sealants.

.8 ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.

.9 ASTM C1611 – Standard Test Method for Slump Flow of Self-Consolidating Concrete.

.10 ASTM D6638 – Standard Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units (Modular Concrete Blocks).
ASTM D6916 – Standard Test Method for Determining Shear Strength Between Segmental Concrete Units (Modular Concrete Blocks).

.3 Geosynthetics

.1 AASHTO M 288 – Geotextile Specification for Highway Applications.

.2 ASTM D3786 – Standard Test Method for Bursting Strength of Textile Fabrics Diaphragm Bursting Strength Tester Method.

.3 ASTM D4354 – Standard Practice for Sampling of Geosynthetics for Testing.

.4 ASTM D4355 – Standard Test Method for Deterioration of Geotextiles

.5 ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.6 ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

.7 ASTM D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.8 ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of

Geotextiles.

.9 ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.10 ASTM D4759 – Standard Practice for Determining Specification Conformance of Geosynthetics.

.11 ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.

.12 ASTM D4873 – Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

.13 ASTM D5262 – Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics.

.14 ASTM D5321 – Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.

.15 ASTM D5818 – Standard Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics.

.16 ASTM D6241 – Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

.17 ASTM D6637 – Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.

.18 ASTM D6706 – Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil.

.19 ASTM D6992 – Standard Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method.

.4 Soils

.1 AASHTO M 145 – AASHTO Soil Classification System.

.2 AASHTO T 104 – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

.3 AASHTO T 267 – Standard Method of Test for Determination of Organic Content in Soils by Loss of Ignition.

.4 ASTM C33 – Standard Specification for Concrete Aggregates.

.5 ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.

.6 ASTM D448 – Standard Classification for

Sizes of Aggregates for Road and Bridge Construction.

.7 ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/ft (2,700 kN-m/m)).

.8 ASTM D1241 – Standard Specification for Materials for Soil-Aggregate Subbase, Base and Surface Courses.

.9 ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

.10 ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort. (56,000 ft-lbf/ft (2,700 kN-m/m)).

.11 ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

.12 ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

.13 ASTM D3080 – Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.

.14 ASTM D4254 – Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

.15 ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.16 ASTM D4767- Test Method for Consolidated-Undrained Triaxial Compression Test for Cohesive Soils.

.17 ASTM D4972 – Standard Test Method for pH of Soils.

.18 ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Aggregate by Nuclear Methods (Shallow Depth).

.19 ASTM G51 – Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing.

.20 ASTM G57 – Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method.

.5 Drainage Pipe

.1 ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.2 ASTM F2648 – Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land

Drainage Applications.

.6 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric

1.5 SUBMITTALS

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

.2 Product Data. At least 14 days prior to construction, the General Contractor shall submit a minimum of six (6) copies of the retaining wall product submittal package to the Departmental Representative for review and approval. The submittal package shall include technical specifications and product data from the manufacturer for the following:
- .1 Precast Modular Block System brochure
- .2 Precast Modular Block concrete test results specified in paragraph 2.01, subparagraph B of this section as follows:
- .3 28-day compressive strength
- .4 Air content
- .5 Slump or Slump Flow (as applicable)
- .6 Drainage Pipe
- .7 Geotextile
- .8 Geosynthetic Soil Reinforcement (if required by the retaining wall design). The contractor shall provide certified manufacturer test reports for the geosynthetic soil reinforcement material in the manufactured roll width specified. The test report shall list the individual roll numbers for which the certified material properties are valid.

.3 Installer Qualification Data. At least 14 days prior to construction, the General Contractor shall submit the qualifications of the business entity responsible for installation of the retaining wall, the Retaining Wall Installation Contractor, per paragraph 1.6, subparagraph 1 of this section.

.4 Retaining Wall Design Calculations and Construction Shop Drawings. At least 14 days prior to construction, the General Contractor shall furnish six (6) sets of construction shop drawings and six (6) copies of the supporting structural calculations report to the Departmental Representative for review and approval. This submittal shall include the following:
- .1 Signed, sealed and dated drawings and engineering calculations prepared in accordance with these specifications.
- .2 Qualifications Statement of Experience of the Retaining Wall Design Engineer as specified in paragraph 1.6, subparagraph 2 of this

section.

.3 Certificate of Insurance of the Retaining Wall Design Engineer as specified in paragraph 1.6, subparagraph 2 of this section.

1.6 CONSTRUCTION SHOP DRAWING PREPARATION

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

.2 The Retaining Wall Design Engineer shall coordinate the retaining wall construction shop drawing preparation with the project Civil Engineer, project Geotechnical Engineer and Departmental Representative. The General Contractor shall furnish the Retaining Wall Design Engineer the project information required to prepare the construction shop drawings.

.3 Design of the precast modular block retaining wall shall satisfy the requirements of this section. Where local design or building code requirements exceed these specifications, the local requirements shall also be satisfied.

.4 The Retaining Wall Design Engineer shall note any exceptions to the requirements of this section by listing them at the bottom right corner of the first page of the construction shop drawings.

.5 Approval or rejection of the exceptions taken by the Retaining Wall Engineer will be made in writing as directed by the Departmental Representative.

.6 The precast modular block design, except as noted herein, shall be based upon AASHTO Load and Resistance Factor Design (LRFD) methodology.

.7 In the event that a conflict is discovered between these specifications and a reasonable interpretation of the design specifications and methods referenced in paragraph 6 above, these specifications shall prevail.

.8 Soil Shear Parameters. The Retaining Wall Design Engineer shall prepare the construction shop drawings based upon soil shear strength parameters from the available project data and the recommendations of the project Geotechnical Engineer. If insufficient data exists to develop the retaining wall design, the Retaining Wall Design Engineer shall communicate the specific deficiency of the project information or data to the Departmental Representative in writing.

.9 Allowable bearing pressure requirements for each retaining wall shall be clearly shown on the construction drawings.

.10 Global Stability. Overall (global) stability shall

be evaluated in accordance with the principals of limit equilibrium analysis as set forth in FHWA-NHI-10-024 Volume I and FHWA-NHI-10-025 Volume II GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes. The minimum factors of safety shall be as follows:

Normal Service (Static)	1.4
Seismic	1.1
Rapid Drawdown (if applicable)	1.2

.11 Seismic Stability. Seismic loading shall be evaluated in accordance with AASHTO Load and Resistance Factor Design (LRFD) methodology.

1.7 QUALITY ASSURANCE

.1 Retaining Wall Installation Contractor Qualifications. In order to demonstrate basic competence in the construction of precast modular block walls, the Retaining Wall Installation Contractor shall document compliance with the following:

- .1 Experience.
  - .1 Construction experience with a minimum of 2,800 square meters of the proposed precast modular block retaining wall system.
  - .2 Construction of at least ten (10) precast modular block (large block) retaining wall structures within the past three (3) years.
  - .3 Construction of at least 4,650 square meters of precast modular block (large block) retaining walls within the past three (3) years.
- .2 Retaining Wall Installation Contractor experience documentation for each qualifying project shall include:
  - .1 Project name and location
  - .2 Date (month and year) of construction completion
  - .3 Contact information of Departmental Representative or General Contractor
  - .4 Type (trade name) of precast modular block system built
  - .5 Maximum height of the wall constructed
  - .6 Face area of the wall constructed
- .3 In lieu of the requirements set forth in items 1 and 2 above, the Retaining Wall Installation Contractor must be a certified Precast Modular Block Retaining Wall Installation Contractor as demonstrated by satisfactory completion of a certified precast modular block retaining wall installation training program administered by the precast modular block manufacturer.

.2 Retaining Wall Design Engineer Qualifications and

Statement of Experience. The Retaining Wall Design Engineer shall submit a written statement affirming that he or she has the following minimum qualifications and experience.

.1 The Retaining Wall Design Engineer shall be licensed to practice in the Province of Ontario.

.2 The Retaining Wall Design Engineer shall be independently capable of performing all internal and external stability analyses, including those for seismic loading, compound stability, rapid draw-down and deep-seated, global modes of failure.

.3 The Retaining Wall Design Engineer shall affirm in writing that he or she has personally supervised the design of the retaining walls for the project, that the design considers all the requirements listed in paragraph 1.5 and that he or she accepts responsibility as the design engineer of record for the retaining wall constructed on the project.

.4 In lieu of these specific requirements, the engineer may submit alternate documentation demonstrating competency in Precast Modular Block retaining wall design.

.3 The Departmental Representative reserves the right to reject the design services of any engineer or engineering firm who, in the sole opinion of the Departmental Representative, does not possess the requisite experience or qualifications.

1.8 QUALITY CONTROL

.1 The Departmental Representative shall review all submittals for materials, design, Retaining Wall Design Engineer qualifications and the Retaining Wall Installation Contractor qualifications.

.2 Parks Canada Association (PCA) shall retain the services of an Inspection Engineer to perform inspection and testing.

.3 PCA ’s engagement of the Inspection Engineer does not relieve the Retaining Wall Installation Contractor of responsibility to construct the proposed retaining wall in accordance with the approved construction shop drawings and these specifications.

.4 The Retaining Wall Installation Contractor shall inspect the on-site grades and excavations prior to construction and notify the Retaining Wall Design Engineer and General Contractor if on-site conditions differ from the elevations and grading conditions depicted in the retaining wall construction shop drawings.

1.9 DELIVERY, STORAGE AND HANDLING

.1 The Retaining Wall Installation Contractor shall inspect the materials upon delivery to ensure that the proper type, grade and color of materials have been delivered.

.2 The Retaining Wall Installation Contractor shall store and handle all materials in accordance with the manufacturer's recommendations as specified herein, other applicable Sections of these specification and in a manner that prevents deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, UV exposure or other causes. Damaged materials shall not be incorporated into the work.

.3 Geosynthetics
- .1 In accordance with Section 31 32 16 9.01 - Geosynthetics.

.4 Precast Modular Blocks
- .1 Precast modular blocks shall be stored in an area with positive drainage away from the blocks. Be careful to protect the block from mud and excessive chipping and breakage. Precast modular blocks shall not be stacked more than three (3) units high in the storage area.

.5 Drainage Aggregate and Backfill Stockpiles
- .1 In accordance with Section 31 05 16 - Aggregate Materials

PART 2 - PRODUCTS

2.1 PRECAST MODULAR BLOCK RETAINING WALL UNITS

.1 All units for the project shall be obtained from the same manufacturer. The manufacturer shall be licensed and authorized to produce the retaining wall units by the precast modular block system patent holder/licensor and shall document compliance with the published quality control standards of the proprietary precast modular block system licensor for the previous three (3) years or the total time the manufacturer has been licensed, whichever is less.

.2 Concrete used in the production of the precast modular block units shall be first-purpose, fresh concrete. It shall not consist of returned, reconstituted, surplus or waste concrete. It shall be an original production mix meeting the requirements of ASTM C94 and exhibit the following:
- .1 Minimum 28-day compressive strength of 4,000 psi (27.6 MPa).
- .2 Shall be free of water soluble chlorides and chloride based accelerator admixtures.
- .3 6% +/- 1½% air-entrainment in conformance

ASTM C94.

.4 Maximum slump of 5 inches +/- 1½ inches (125 mm +/- 40 mm) per ASTM C143 for conventional concrete mix designs.

.5 Slump Flow for Self-Consolidating Concrete (SCC) mix designs shall be between 18 inches and 32 inches (450 mm and 800 mm) as tested in accordance with ASTM C1611.

.3 Each concrete block shall be cast in a single continuous pour without cold joints. With the exception of half-block units, corner units and other special application units, the precast modular block units shall conform to the nominal dimensions listed in the table below and be produced to the dimensional tolerances shown.

Block Type	**Dimension**	**Nominal Value**	**Tolerance**
28″ (710 mm) Block	Height	18″ (457 mm)	+/- 3/16″ (5 mm)
	Length	46-1/8″ (1172 mm)	+/- 1/2″ (13 mm)
	Width*	28″ (710 mm)	+/- 1/2″ (13 mm)
41″ (1030 mm) Block	Height	18″ (457 mm)	+/- 3/16″ (5 mm)
	Length	46-1/8″ (1172 mm)	+/- 1/2″ (13 mm)
	Width*	40-1/2″ (1030 mm)	+/- 1/2″ (13 mm)
60″ (1520 mm) Block	Height	18″ (457 mm)	+/- 3/16″ (5 mm)
	Length	46-1/8″ (1172 mm)	+/- 1/2″ (13 mm)
	Width*	60″ (1520 mm)	+/- 1/2″ (13 mm)

* Excluding Variable Face Texture

.4 Individual block units shall have a nominal height of 18 inches (457 mm).

.5 With the exception of half-block units, corner units and other special application units, the precast modular block units shall have two (2), circular dome shear knobs that are 10 inches (254 mm), 7.5 inches (190 mm), or 6.75 inches (171 mm) in diameter and 4 inches (102 mm) or 2 inches (51 mm) in height. The shear knobs shall fully index into a continuous semi-cylindrical shear channel in the bottom of the block course above. ThePeak interlock shear between any two (2) vertically stacked precast modular block units, with 10 inch (254 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 6,500 lb/ft (95 kN/m) at a minimum normal load of 500 lb/ft (7kN/m). as well as an

ultimate peak interface shear capacity in excess of 11,000 lb/ft (160 kN/m). The peak interlock shear between any two (2) vertically stacked precast modular block units, with 7.5 inch (190 mm) or 6.75 inch (171 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 1,850 lb/ft (27 kN/m) at a minimum normal load of 500 lb/ft (7kN/m) as well as an ultimate peak interface shear capacity in excess of 10,000 lb/ft (146 kN/m).Test specimen blocks tested under ASTM D6916 shall be actual, full-scale production blocks of known compressive strength. The interface shear capacity reported shall be corrected for a 4,000 psi (27.6 MPa) concrete compressive strength. Regardless of precast modular block configuration, interface shear testing shall be completed without the inclusion of unit core infill aggregate.

.6 The 28” (710 mm) and 41” (1030 mm) precast modular block units shall be cast with a 13” (330 mm) wide, continuous vertical core slot that will permit the insertion of a 12” (305 mm) inch wide strip of geogrid reinforcement to pass completely through the block. When installed in this manner, the geogrid reinforcement shall form a non-normal load dependent, positive connection between the block unit and the reinforcement strip. The use of steel for the purposes of creating the geogrid to block connection is not acceptable.

.7 Without field cutting or special modification, the precast modular block units shall be capable of achieving a minimum radius of 14 ft 6 in (4.42 m).

.8 The precast modular block units shall be manufactured with an integrally cast shear knobs that establishes a standard horizontal set-back for subsequent block courses. The precast modular block system shall be available in the four (4) standard horizontal set-back facing batter options listed below:

Horizontal Set-Back/Blk. Course	Max. Facing Batter
3/8” (10 mm)	1.2˚
1-5/8” (41 mm)	5.2˚
9-3/8” (238 mm)	27.5˚
16-5/8” (422 mm)	42.7˚

The precast modular block units shall be furnished with the required shear knobs that provide the facing batter required in the construction shop drawings.

.9 The precast modular block unit face texture shall be selected by the Departmental Representative from the available range of textures available from the precast modular block manufacturer. Each textured block facing unit shall be a minimum of 5.76 square feet (0.54 square meters) with a unique texture pattern that repeats with a

maximum frequency of once in any 15 square feet (1.4 square meters) of wall face.

.10 The block color shall be selected by the Departmental Representative from the available range of colors available from the precast modular block manufacturer.

.11 All precast modular block units shall be sound and free of cracks or other defects that would interfere with the proper installation of the unit, impair the strength or performance of the constructed wall. PMB units to be used in exposed wall construction shall not exhibit chips or cracks in the exposed face or faces of the unit that are not otherwise permitted. Chips smaller than 1.5" (38 mm) in its largest dimension and cracks not wider than 0.012" (0.3 mm) and not longer than 25% of the nominal height of the PMB unit shall be permitted. PMB units with bug holes in the exposed architectural face smaller than 0.75" (19 mm) in its largest dimension shall be permitted. Bug holes, water marks, and color variation on non-architectural faces are acceptable. PMB units that exhibit cracks that are continuous through any solid element of the PMB unit shall not be incorporated in the work regardless of the width or length of the crack.

.12 Suggested Manufacturers.

.1 Manufacturers of Redi-Rock Retaining Wall Systems as licensed by Redi-Rock International, LLC, 05481 US 31 South, Charlevoix, MI 49720 USA; telephone (866) 222-8400; website www.redi-rock.com.

.13 Substitutions. Technical information demonstrating conformance with the requirements of this specification for an alternative retaining wall system must be submitted for preapproval at least 14 calendar days prior to the bid date. Acceptable alternative PMB retaining wall systems, otherwise found to be in conformance with this specification, shall be approved in writing by the Departmental Representative 7 days prior to the bid date. The Departmental Representative's reserves the right to provide no response to submissions made out of the time requirements of this section or to submissions of block retaining wall systems that are determined to be unacceptable to the Departmental Representative.

.14 Value Engineering Alternatives. The Departmental Representative may evaluate and accept alternative systems.

2.2 GEOGRID REINFORCEMENT

.1 Geogrid reinforcement shall be a woven or knitted PVC coated geogrid manufactured from high-tenacity PET polyester fiber with an average molecular weight greater than 25,000 (Mn > 25,0000) and a carboxyl end group less than 30 (CEG < 30). The geogrid shall be furnished in

prefabricated roll widths of certified tensile strength by the manufacturer. The prefabricated roll width of the geogrid shall be 12" (300 mm) +/- 1/2" (13 mm). No cutting of geogrid reinforcement down to the 12" (300 mm) roll width from a larger commercial roll width will be allowed under any circumstances.

.2 The ultimate tensile strength (Tult) of the geogrid reinforcement shall be measured in accordance with ASTM D6637.

.3 Geogrid – Soil Friction Properties

.1 Friction factor, F*, shall be equal to 2/3 Tan Φ, where Φ is the effective angle of internal friction of the reinforced fill soil.

.2 Linear Scale Correction Factor, α, shall equal 0.8.

.4 Long-Term Tensile Strength (Tal) of the geogrid reinforcement shall be calculated in accordance with Section 3.5.2 of FHWA-NHI-10-024 and as provided in this specification.

.1 The creep reduction factor (RFCR) shall be determined in accordance with Appendix D of FHWA-NHI-10-025 for a minimum 75 year design life.

.2 Minimum installation damage reduction factor (RFID) shall be 1.25. The value of RFID shall be based upon documented full-scale tests in a soil that is comparable to the material proposed for use as reinforced backfill in accordance with ASTM D5818.

.3 Minimum durability reduction factor (RFD) shall be 1.3 for a soil pH range of 3 to 9.

.5 Connection between the PMB retaining wall unit and the geogrid reinforcement shall be determined from short-term testing per the requirements of FHWA NHI-10-025, Appendix B.4 for a minimum 75-year design life.

.6 The minimum value of Tal for geogrid used in design of a reinforced precast modular block retaining wall shall be 2,000 lb/ft (29 kN/m) or greater.

.7 The minimum length of geogrid reinforcement shall be the greater of the following:

.1 0.7 times the wall design height, H.

.2 6 feet (1.83 m).

.3 The length required by design to meet internal stability requirements, soil bearing pressure requirements and constructability requirements.

.8 Constructability Requirements. Geogrid design embedment length shall be measured from the back of the

precast modular block facing unit and shall be consistent for the entire height of a given retaining wall section.

.9 Geogrid shall be positively connected to every precast modular block unit. Design coverage ratio, Rc, as calculated in accordance with AASHTO LRFD Bridge Design Specifications Figure 11.10.6.4.1-2 shall not exceed 0.50.

.10 Preapproved Geogrid Reinforcement Products.

.1 Miragrid XT Geogrids as manufactured by TenCate Geosynthetics of Pendergrass, Georgia USA and distributed by Manufacturers of the Redi-Rock Retaining Wall System.

2.3 GEOTEXTILE

.1 Nonwoven geotextile fabric shall be placed as indicated on the retaining wall construction shop drawings. Additionally, the nonwoven geotextile fabric shall be placed in the v-shaped joint between adjacent block units on the same course. The nonwoven geotextile fabric shall meet the requirements Class 3 construction survivability in accordance with AASHTO M 288.

.2 . Preapproved Nonwoven Geotextile Products

.1 Mirafi 140N
.2 Propex Geotex 451
.3 Skaps GT-142
.4 Thrace-Linq 140EX
.5 Carthage Mills FX-40HS
.6 Stratatex ST 142

2.4 DRAINAGE AGGREGATE AND WALL INFILL

.1 Drainage aggregate (and wall infill for retaining walls designed as modular gravity structures) shall be a durable crushed stone conforming to No. 57 size per ASTM C33 with the following particle-size distribution requirements per ASTM D422:

U.S. Standard Sieve Size	% Passing
1-½" (38 mm)	100
1" (25 mm)	95-100
½" (13 mm)	25-60
No. 4 (4.76 mm)	0-10
No. 8 (2.38 mm)	0-5

2.5 REINFORCED FILL

.1 Material used as reinforced backfill material in the reinforced zone (if applicable) shall be a granular fill material meeting the requirements of USCS soil type GW, GP, SW or SP per ASTM D2487 or alternatively by AASHTO Group Classification A-1-a or A-3 per AASHTO M 145. The backfill shall exhibit a minimum effective internal angle of friction, ϕ = 34 degrees at a maximum 2% shear strain and meet the following particle-size distribution requirements per ASTM D422.

U.S. Standard Sieve Size	% Passing
3/4" (19 mm)	100

No. 4 (4.76 mm)	0-100
No. 40 (0.42 mm)	0-60
No. 100 (0.15 mm)	0-10
No. 200 (0.07 mm)	0-15

2.6 LEVELING PAD

.1 The precast modular block units shall be placed on a leveling pad constructed from unreinforced concrete. The leveling pad shall be constructed to the dimensions and limits shown on the retaining wall design drawings prepared by the Retaining Wall Design Engineer.

.2 Concrete used for construction of an unreinforced concrete leveling pad shall satisfy the criteria for AASHTO Class B. The concrete should be cured a minimum of 12 hours prior to placement of the precast modular block wall retaining units and exhibit a minimum 28-day compressive strength of 2,500 psi (17.2 MPa).

2.7 DRAINAGE

.1 Drainage Pipe

.1 Drainage collection pipe shall be a 4” (100 mm) diameter, 3-hole perforated, HDPE pipe with a minimum pipe stiffness of 22 psi (152 kPa) per ASTM D2412.

.2 The drainage pipe shall be manufactured in accordance with ASTM D1248 for HDPE pipe and fittings.

PART 3 - EXECUTION

3.1 GENERAL

.1 All work shall be performed in accordance with Occupational Health and Safety Act, safety standards, provincial and local building codes and manufacturer’s requirements.

.2 New utilities installed below the retaining wall shall be backfilled and compacted to a minimum of 98% maximum dry density per ASTM D698 standard proctor.

.3 The General Contractor is responsible to ensure that safe excavations and embankments are maintained throughout the course of the project.

.4 All work shall be inspected by the Inspection Engineer as directed by the Departmental Representative.

3.2 EXAMINATION

.1 Prior to construction, the General Contractor, Grading Contractor, Retaining Wall Installation Contractor and Inspection Engineer shall examine the areas in which the retaining wall will be constructed to evaluate compliance with the requirements for installation tolerances, worker safety and any site conditions affecting performance of the completed structure. Installation shall proceed only after

unsatisfactory conditions have been corrected.

3.3 PREPARATION

.1 Fill Soil.

.1 The Inspection Engineer shall verify that reinforced backfill placed in the reinforced soil zone satisfies the criteria of this section.

.2 The Inspection Engineer shall verify that any fill soil installed in the foundation and retained soil zones of the retaining wall satisfies the specification of the Retaining Wall Design Engineer as shown on the construction drawings.

.2 Excavation.

.1 The Grading Contractor shall excavate to the lines and grades required for construction of the precast modular block retaining wall as shown on the construction drawings. The Grading Contractor shall minimize over-excavation. Excavation support, if required, shall be the responsibility of the Grading Contractor.

.2 Over-excavated soil shall be replaced with compacted fill in conformance with the specifications of the Retaining Wall Design Engineer and Section 31 23 33 - Excavating Trenching and Backfilling of these project specifications.

.3 Embankment excavations shall be bench cut as directed by the project Geotechnical Engineer and inspected by the Inspection Engineer for compliance.

.3 Foundation Preparation.

.1 Prior to construction of the precast modular block retaining wall, the leveling pad area and undercut zone (if applicable) shall be in accordance with Section 31 23 16 – Rock Removals.

.2 Following excavation for the leveling pad and undercut zone (if applicable), the Inspection Engineer shall evaluate the foundation.

.1 The Inspection Engineer shall verify that the shear strength foundation assumed by the Retaining Wall Design Engineer is appropriate. The Inspection Engineer shall immediately stop work and notify the Departmental Representative if the in-situ shear strength is found to be inconsistent with the retaining wall design assumptions.

.2 The Inspection Engineer shall verify that the foundation exhibits sufficient ultimate bearing capacity to satisfy

the requirements indicated on the retaining wall construction shop drawings.

.4 Leveling Pad.

.1 The leveling pad shall be constructed to provide a level, hard surface on which to place the first course of precast modular block units. The leveling pad shall be placed in the dimensions shown on the retaining wall construction drawings and extend to the limits indicated.

.2 The Retaining Wall Installation Contractor shall erect proper forms as required to ensure the accurate placement of the concrete leveling pad according to the retaining wall construction drawings.

3.4 PRECAST MODULAR BLOCK WALL SYSTEM INSTALLATION

.1 The precast modular block structure shall be constructed in accordance with the construction drawings, these specifications and the recommendations of the retaining wall system component manufacturers. Where conflicts exist between the manufacturer's recommendations and these specifications, these specifications shall prevail.

.2 Drainage components. Pipe, geotextile and drainage aggregate shall be installed as shown on the construction shop drawings.

.3 Precast Modular Block Installation

.1 The first course of block units shall be placed with the front face edges tightly abutted together on the prepared leveling pad at the locations and elevations shown on the construction drawings. The Retaining Wall Installation Contractor shall take special care to ensure that the bottom course of block units are in full contact with the leveling pad, are set level and true and are properly aligned according to the locations shown on the construction drawings.

.2 Backfill shall be placed in front of the bottom course of blocks prior to placement of subsequent block courses. Nonwoven geotextile fabric shall be placed in the V-shaped joints between adjacent blocks. Drainage aggregate shall be placed in the V-shaped joints between adjacent blocks to a minimum distance of 12" (300 mm) behind the block unit.

.3 Drainage aggregate shall be placed in 9 inch maximum lifts and compacted by a minimum of three (3) passes of a vibratory plate compactor capable exerting a minimum of 2,000 lb (8.9 kN) of centrifugal force.

.4 Unit core fill shall be placed in the precast modular block unit vertical core slot. The core fill shall completely fill the slot to the level of the top of the block unit. The top of the block unit shall be broom-cleaned prior to placement of subsequent block courses. No additional courses of precast modular blocks may be stacked before the unit core fill is installed in the blocks on the course below.

.5 Base course blocks for gravity wall designs (without geosynthetic soil reinforcement) may be furnished without vertical core slots. If so, disregard item 4 above, for the base course blocks in this application.

.6 Nonwoven geotextile fabric shall be placed between the drainage aggregate and the retained soil (gravity wall design) or between the drainage aggregate and the reinforced fill (reinforced wall design) as required on the retaining wall construction drawings.

.7 Subsequent courses of block units shall be installed with a running bond (half block horizontal course-to-course offset). With the exception of 90 degree corner units, the shear channel of the upper block shall be fully engaged with the shear knobs of the block course below. The upper block course shall be pushed forward to fully engage the interface shear key between the blocks and to ensure consistent face batter and wall alignment. Geogrid, drainage aggregate, unit core fill, geotextile and properly compacted backfill shall be complete and in-place for each course of block units before the next course of blocks is stacked.

.8 The elevation of retained soil fill shall not be less than 1 block course (18” (457 mm)) below the elevation of the reinforced backfill throughout the construction of the retaining wall.

.9 If included as part of the precast modular block wall design, cap units shall be secured with an adhesive in accordance with the precast modular block manufacturer’s recommendation.

.4 Geogrid Reinforcement Installation (if required)

.1 Geogrid reinforcement shall be installed at the locations and elevations shown on the construction drawings on level fill compacted to the requirements of this specification.

.2 Continuous 12” (300 mm) wide strips of geogrid reinforcement shall be passed completely through the vertical core slot of

the precast modular block unit and extended to the embedment length shown on the construction plans. The strips shall be staked or anchored as necessary to maintain a taut condition.

.3 Reinforcement length (L) of the geogrid reinforcement is measured from the back of the precast modular block unit. The cut length (Lc) is two times the reinforcement length plus additional length through the block facing unit. The cut length is calculated as follows:

L_c = 2*L + 3 ft (2*L + 0.9 m) (28″ (710 mm) block unit)
L_c = 2*L + 5 ft (2*L + 1.5 m) (41″ (1030 mm) block unit)

.4 The geogrid strip shall be continuous throughout its entire length and may not be spliced. The geogrid shall be furnished in nominal, prefabricated roll widths of 12″ (300 mm)+/- ½″ (13 mm). No field modification of the geogrid roll width shall be permitted.

.5 Neither rubber tire nor track vehicles may operate directly on the geogrid. Construction vehicle traffic in the reinforced zone shall be limited to speeds of less than 5 mph (8 km/hr) once a minimum of 9 inches (230 mm) of compacted fill has been placed over the geogrid reinforcement. Sudden braking and turning of construction vehicles in the reinforced zone shall be avoided.

.5 Construction Tolerance. Allowable construction tolerance of the retaining wall shall be as follows:

.1 Deviation from the design batter and horizontal alignment, when measured along a 10′ (3 m) straight wall section, shall not exceed 3/4″ (19 mm).

.2 Deviation from the overall design batter shall not exceed 1/2" (13 mm) per 10′ (3 m) of wall height.

.3 The maximum allowable offset (horizontal bulge) of the face in any precast modular block joint shall be 1/2″ (13 mm).

.4 The base of the precast modular block wall excavation shall be within 2″ (50 mm) of the staked elevations, unless otherwise approved by the Inspection Engineer.

.5 Differential vertical settlement of the face shall not exceed 1′ (300 mm) along any 200′ (61 m) of wall length.

.6 The maximum allowable vertical displacement of the face in any precast modular block joint shall be 1/2" (13 mm).

.7 The wall face shall be placed within 2" (50 mm) of the horizontal location staked.

3.5 WALL INFILL AND REINFORCED BACKFILL PLACEMENT

.1 Backfill material placed immediately behind the drainage aggregate shall be compacted as follows:

.1 98% of maximum dry density at ± 2% optimum moisture content per ASTM D698 standard proctor or 85% relative density per ASTM D4254.

.2 Compactive effort within 3' (0.9 m) of the back of the precast modular blocks should be accomplished with walk-behind compactors. Compaction in this zone shall be within 95% of maximum dry density as measured in accordance with ASTM D698 standard proctor or 80% relative density per ASTM D 4254. Heavy equipment should not be operated within 3' (0.9 m) of the back of the precast modular blocks.

.3 Backfill material shall be installed in lifts that do not exceed a compacted thickness of 9" (230 mm).

.4 At the end of each work day, the Retaining Wall Installation Contractor shall grade the surface of the last lift of the granular wall infill to a 3% ± 1% slope away from the precast modular block wall face and compact it.

.5 The General Contractor shall direct the Grading Contractor to protect the precast modular block wall structure against surface water runoff at all times through the use of berms, diversion ditches, silt fence, temporary drains and/or any other necessary measures to prevent soil staining of the wall face, scour of the retaining wall foundation or erosion of the reinforced backfill or wall infill.

3.6 OBSTRUCTIONS IN THE INFILL AND REINFORCED FILL ZONE

.1 The Retaining Wall Installation Contractor shall make all required allowances for obstructions behind and through the wall face in accordance with the approved construction shop drawings.

.2 Should unplanned obstructions become apparent for which the approved construction shop drawings do not account, the affected portion of the wall shall not be constructed until the Retaining Wall Design Engineer can appropriately address the required procedures for construction of the wall section in question.

3.7 COMPLETION

.1 For walls supporting unpaved areas, a minimum of 12" (300 mm) of compacted, low-permeability fill shall be placed over the granular wall infill zone of the precast modular block retaining wall structure. The adjacent retained soil shall be graded to prevent ponding of water behind the completed retaining wall.

.2 For retaining walls with crest slopes of 5H:1V or steeper, silt fence shall be installed along the wall crest immediately following construction. The silt fence shall be located 3′ to 4′ (0.9 m to 1.2 m) behind the uppermost precast modular block unit. The crest slope above the wall shall be immediately seeded to establish vegetation. The General Contractor shall ensure that the seeded slope receives adequate irrigation and erosion protection to support germination and growth.

.3 The General Contractor shall confirm that the as-built precast modular block wall geometries conform to the requirements of this section. The General Contractor shall notify the Departmental Representative of any deviations.

3.8 CLEANING

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

.2 Dispose of surplus material off site in accordance with Section 01 74 21 - Construction/demolition Waste Management and Disposal.

.3 Do not surplus material into landfill. Send material to appropriate location as approved by Departmental Representative.

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

3.9 PROTECTION

.1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1 Section 31 11 00 -Clearing and Grubbing.

.2 Section 31 24 13 –Roadway Embankments

1.2 MEASURAMENT AND PAYMENT .1 In accordance with Section 01 22 01 –Measurement and Payment

.2 There will be no measurement of work included in this Section.

.3 Payment shall be included in the Lump Sum Prices for Site restoration and General Site Work.

1.3 TESTING .1 Testing of topsoil: Departmental Representative will pay for cost of tests if required.

1.4 REFERENCES .1 Agriculture and Agri-Food Canada
.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment
.1 PN1340-[2005], Guidelines for Compost Quality.

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

1.5 DEFINITIONS .1 Compost:
.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
.3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25), and contain no toxic or growth inhibiting contaminates.
.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category A.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality control submittals :
.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 QUALITY ASSURANCE

.1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements

1.8 WASTE MANAGEMENT AND DISPOSAL

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

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

2.1 TOPSOIL

.1 Topsoil for seeded areas: mixture of particulates, microorganisms and organic matter which provides suitable medium for supporting intended plant growth.
.1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
.2 Contain no toxic elements or growth inhibiting materials.
.3 Finished surface free from:
.1 Debris and stones over 50 mm diameter.
.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
.4 Consistence: friable when moist.

2.2 SOIL AMENDMENTS

.1 Fertilizer:
.1 Fertility: major soil nutrients present in following amounts:
.2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
.3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
.4 Potassium (K): 75 to110 micrograms of potassium per gram of topsoil.
.5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
.6 Ph value: 6.5 to 8.0.

.2 Peatmoss:
.1 Derived from partially decomposed species of Sphagnum Mosses.
.2 Elastic and homogeneous, brown in colour.
.3 Free of wood and deleterious material which could prohibit growth.
.4 Shredded particle minimum size: [5] mm.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Organic matter: compost Category A, in accordance with [CCME PN1340], unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.

.6 Limestone:
.1 Ground agricultural limestone.
.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.7 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

2.3 SOURCE QUALITY CONTROL

.1 Grubbed and stockpiled local soil from the project site is preferred over importing any soil from off site in order to reduce the risk of importing invasive plant species.

.2 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.

.3 Contractor is responsible for amendments to supply topsoil as specified.

.4 Soil testing by recognized testing facility for PH, P and K, and organic matter.

.5 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

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

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

3.2 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of brush, weeds and grasses and removed from site.

.2 Strip topsoil to depths as directed by Departmental Representative.
.1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.3 Stockpile in locations as directed by Departmental Representative.
.1 Stockpile height not to exceed 2 m.

.4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Departmental Representative.

.5 Protect stockpiles from contamination and compaction.

3.3 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.
.1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
.2 Remove debris which protrudes more than [75] mm above surface.
.3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 For sodded areas keep topsoil 15 mm below finished grade.

.4 Spread topsoil to following minimum depths after settlement.
.1 150 mm for seeded areas.
.2 135 mm for sodded areas.
.3 300 mm for flower beds.
.4 500 mm for shrub beds.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.5 SOIL AMENDMENTS

.1 For turf: apply and thoroughly mix soil amendments into full specified depth of topsoil as directed by Departmental Representative.

3.6 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.
.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by [Departmental Representative] [DCC Representative] [Consultant].

.1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.7 ACCEPTANCE

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

3.8 SURPLUS MATERIAL

.1 Dispose of materials except topsoil not required off site in accordance with Section 01 74 21 –Waste Management and Disposal.

3.9 CLEANING

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

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1 Section 32 91 19.13 –Topsoil Placement

1.2 MEASURAMENT AND PAYMENT .1 In accordance with Section 01 22 01 –Measurement and Payment

.2 There will be no measurement of work included in this Section.

.3 Payment shall be included in the Lump Sum Price for Site restoration.

1.3 ADMINISTRATIVE REQUIREMENTS .1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

.2 Scheduling:
.1 Schedule hydraulic seeding to coincide with preparation of soil surface.
.2 Schedule hydraulic seeding using grass mixtures between dates recommended by Provincial Agricultural Department.

1.4 REFERENCES Not used.

1.5 ACTION AND INFORMATIONAL SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.
.2 Submit 2 copies of WHMIS MSDS in accordance with Sections 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

.3 Submit in writing 7 days prior to commencing work:
.1 Volume capacity of hydraulic seeder in litres.
.2 Amount of material to be used per tank based on volume.
.3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

1.6 QUALITY ASSURANCE

.1 Qualifications:
.1 Landscape Contractor: to be a Member in Good Standing of Ontario Horticultural Trades Association.
.2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:
.1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
.2 Inoculant containers to be tagged with expiry date.

.3 Storage and Handling Requirements:
.1 Store fertilizer off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Packaging Waste Management: remove for recycling packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 WARRANTY

.1 For seeding, 12 months warranty period is extended to 24 months.

.2 End-of-warranty inspection will be conducted by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
.1 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".

.2 Seed mixtures shall be suited to the climate, soil conditions and type, orientation, sun exposure, terrain, establishment and maintenance conditions under which they are to be grown. See section 32 94 00 –General Landscaping for requirements.

.3 Seed shall have a minimum germination rate of 85% and minimum purity of 97%, except where otherwise required by the specification of the seed mixture.

.4 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, free of germination and growth inhibiting factors with following properties:
.1 Type I mulch:
.1 Made from wood cellulose fibre.
.2 Organic matter content: 95% plus or minus 0.5%.
.3 Value of pH: 6.0.
.4 Potential water absorption: 900%.
.2 Type II mulch:
.1 Made from raw cotton fiber and straw, processed to produce fibre lengths of 15 mm minimum and 25 mm maximum. Greater proportions of ingredients to be straw.

.5 Tackifier: water soluble vegetable carbohydrate powder.

.6 Water: free of impurities that would inhibit germination and growth.

.7 Fertilizer:
.1 To Canada "Fertilizers Act" and Regulations.
.2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.

.8 Inoculants: inoculant containers to be tagged with expiry date.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for hydraulic seeding in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLERS

.1 Use installers members in Good Standing of Ontario Horticultural Trades Association.

3.3 PROTECTION OF EXISTING CONDITIONS

.1 Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray.

.2 Immediately remove any material sprayed where not intended as directed by Departmental Representative.

3.4 PREPARATION OF SURFACES

.1 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.

.2 Fine grade areas to be seeded free of humps and hollows.
.1 Ensure areas are free of deleterious and refuse materials.

.3 Cultivated areas identified as requiring cultivation to depth of 25 mm.

.4 Ensure areas to be seeded are moist to depth of 100 mm before seeding.

.5 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.

3.5 FERTILIZING PROGRAM

.1 Rates of application of fertilizers, seed mixtures, mulch and other components shall be based on an analysis of the season, climate, terrain, soil, and establishment and maintenance conditions affecting the project.

3.6 PREPARATION OF SLURRY

.1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. Supply equipment required for this work.

.2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.

.3 After materials are in seeder and well mixed, charge tackifier, if applicable, into seeder and mix thoroughly to complete slurry.

3.7 SLURRY APPLICATION

.1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.

.2 Hydraulic seeding equipment:
.1 Slurry tank.
.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
.3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
.4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".

.3 Slurry mixtures shall be suited to the seed mixture, climate, soil conditions and terrain, to which they are to be applied.

.4 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
.1 Using correct nozzle for application.
.2 Using hoses for surfaces difficult to reach and to control application.

.5 Blend application 300 mm into adjacent grass areas or previous applications to form uniform surfaces.

.6 Re-apply where application is not uniform.

.7 Remove slurry from items and areas not designated to be sprayed.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section [01 74 11 - Cleaning].
.1 Leave Work area clean at end of each day.
.2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section [01 74 11 - Cleaning].
.1 Clean and reinstate areas affected by Work.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
.2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.9 PROTECTION

.1 Protect seeded areas from trespass until plants are established.

.2 Remove protection devices as directed by Departmental Representative.

3.10 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.

.3 Grass Mixture:
.1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
.2 Fertilize seeded areas after 8 weeks after germination provided plants have mature true leafs. Spread half of required amount of fertilizer in one direction and remainder at right angles.
.3 Control weeds by mechanical utilizing acceptable integrated pest management practices.

3.11 ACEPTANCE

.1 Seeded areas will be accepted by Departmental Representative provided that:
.1 Seeded areas are free of rutted, eroded, bare or dead spots.
.2 Areas have been fertilized.

.2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.12 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:
.1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.

.2 Fertilize seeded areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for reinstating damaged landscaped areas within the work and staging areas, access route and areas disturbed by the work and consists of:
.1 Restoring existing access route and parking area to its original state.
.2 Supplying, placing, and finish grading of a topsoil bed and nursery sod.
.3 Restoring natural grassed areas by seeding with native species grass and wildflower mix.
.4 Maintaining sodded and seeded areas until acceptance.

.2 All disturbed sodded areas to be covered with topsoil, smoothed to the finish grade, and re-sodded at Contractor's expense, or to be covered with topsoil, smoothed to the finish grade, and restored by seeding at Contractor's expense.

1.2 MEASUREMENT AND PAYMENT PROCEDURES

.1 There will be no measurement of General Landscaping of General Site Work and Site Restoration.

.2 Payment of General Landscaping shall be included in the Lump Sum Price.

1.3 RELATED SECTIONS

.1 Section 01 11 00 – Summary of Work.

.2 Section 01 35 43 - Environmental Procedures.

1.4 PRELIMINARY INSPECTION

.1 Establish the condition of sodded areas in conjunction with Departmental Representative before starting work.

1.5 SOURCE QUALITY CONTROL

.1 At least 2 weeks before starting final work, advise Departmental Representative of proposed sources of all materials. Provide Departmental Representative with access to the sources for inspection, sampling and testing.

.2 When proposed sources are approved, use no other sources without written authorization from Departmental Representative.

1.6 DELIVERY AND STORAGE

.1 Schedule deliveries in order to keep storage at the job site to a minimum without causing delays.

.2 Deliver, unload and store rolled sod on pallets only.

.3 Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.

.4 Do not deliver small, irregular, or broken pieces of sod. Departmental Representative will reject these.

.5 During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling.

.6 During dry weather, protect sod and from drying. Water sod as necessary to ensure its vitality and prevent dropping soil in handling. The Departmental Representative will reject dried-out sod.

1.7 SCHEDULING OF SODDING AND SEEDING WORK

.1 Schedule sod laying and seeding to coincide with final topsoil operations.

.2 Obtain Departmental Representative's approval of the schedule for seeding before proceeding.

PART 2 - PRODUCTS

2.1 TOPSOIL

.1 New topsoil to be a friable sandy-clayish loam of good humus content, suitable for supporting sod growth, free from:
.1 Debris and stones over 50 mm diameter.
.2 Coarse vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.2 Approval of topsoil material subject to soil testing and analysis. Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative. Departmental Representative will pay for cost of tests.

2.2 SOD

.1 Nursery sod: Quality and source to comply with standards outlined in "Guide Specification for Nursery Stock", Section 17, 1978 edition, published by Canadian Nursery Trades Association.

.2

.1 Number 1 Kentucky Bluegrass/Fescue sod" sod grown from minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue.

2.3 SEEDS

.1 Number 1 Kentucky Bluegrass/Fescue seeds to produce sod with minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue.

.2 Native species mix to be approved by Departmental Representative.

PART 3 - EXECUTION

3.1 PREPARATION OF TOPSOIL SUB-GRADE

.1 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not start other landscape work in that area until instructed to do so in writing by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring that new sodded surface will be faired-off to the existing sodded areas with no sharp transition.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

.4 Coarse cultivate entire area which is to receive topsoil to depth of 100 mm. Coarse cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING AND SPREADING OF TOPSOIL

.1 Place topsoil after Departmental Representative has accepted sub-grade.

.2 Spread topsoil to 150 mm minimum depth after settlement and 80% compaction. Keep final elevation 15 mm below finished grade to allow room for sod.

.3 Manually spread topsoil around trees, shrubs and obstacles.

.4 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.5 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative. Leave surfaces smooth, uniform and firm enough to resist deep footprints.

3.3 ACCEPTANCE OF TOPSOIL GRADING

.1 Departmental Representative will inspect topsoil in place and determine acceptance of depth of topsoil and finish grading.

3.4 SURPLUS TOPSOIL MATERIALS

.1 Dispose of materials not required off site.

3.5 SODDING AND SEEDING

.1 Obtain Departmental Representative's approval of topsoil grade and depth before starting sodding and seeding lawn.

.2 Loosen surface of topsoil where it has become compacted.

.3 Protect all sodded and seeded areas against any damage until sod has been fully established. Supply and install required established protective apparatus.

3.6 SOD PLACEMENT

.1 Lay sod within 18 hours of being lifted if air temperature exceeds 20 degrees C.

.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.7 MAINTENANCE OF SODDED AND SEEDED AREAS

.1 Maintain sodded and seeded areas until accepted by Departmental Representative.

.2 Apply water to ensure establishment and continuous growth of grass. Apply sufficient water to ensure moisture penetration of 200 mm into soil below sod.
.1 Use clean water from river with a fish screen installed on pump intakes; or
.2 Use potable water within 5 degrees C of river temperature.

.3 Cut grass when it reaches a height of 80 mm. Cut grass thereafter frequently enough to be kept at a height of 80 to 100 mm. Allow clippings to remain.

3.8 ACCEPTANCE OF SODDED AND SEEDED AREAS

.1 Approval of material at its source does not prevent subsequent rejection on job site.

.2 Sodded and seeded lawn will be approved when:
.1 Growth of sodded and seeded areas has been properly established;
.2 Turf is free of bare and dead spots;
.3 No surface soil is visible when grass has been mowed to a height of 80 mm; and,

3.9 SODDING ON SLOPES GREATER THAN THREE TO ONE

.1 Lay sod sections perpendicular to slopes greater than 3:1 (run/rise) and secure with stakes. Place 3 stakes per m^2, 100 mm below top edge to prevent shifting of sod and drive stakes flush with top of sod soil.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for dewatering work described by drawings and specifications.

.2 The work includes but is not limited to:

.1 The design, construction, maintenance and operation methods of the systems used to remove water from the work spaces.

.1 Existing stoplogs will be left in place for use by PCA staff for operation of the dam during construction, including for dewatering and diversion purposes.

.2 New stoplogs for the new dam will be supplied by in accordance with Section 06 10 00 –Rough Carpentry for use by PCA staff for operation of the dam during construction, including for dewatering and diversion purposes.

.2 Provision and maintenance of dewatering systems for removal of water from the work spaces.

.3 Removal of water from the work spaces and the continued maintenance of these spaces in the dry state for the duration of the work to meet work requirements and environmental regulations.

.4 Supply of standby equipment to replace dewatering equipment which malfunctions.

.5 The removal of the materials used for the dewatering structure, in accordance with the restriction window for in-water work described in Section 01 14 00 –Work Restrictions. See also Item 1.8.

1.2 MEASURAMENT AND PAYMENT PROCEDURES

.1 There will be no measurement of Dewatering.

.2 Payment of Dewatering work shall be included in the Lump Sum Price for Dewatering.

1.3 RELATED WORK

.1 Section 01 35 43 – ENVIRONMENTAL PROCEDURES.

1.4 REGULATORY REQUIREMENT

.1 Adhere to local, provincial and federal requirements relating to:

.1 Protection of environment;

.2 Safety of construction; and

.3 Protection of workers.

.2 Pumping water out of dewatering enclosure: to Section 01 35 43 –Environmental Procedures.

.3 Obtain and pay costs of all required permits.

1.5 SUBMITTALS

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

.2 Shop drawings presenting methodology of water-tight dewatering systems and additional component.

.3 Submit detail drawings to Regulatory Agencies, as required to satisfy conditions for granting of permits.

1.6 DESIGN CRITERIA

.1 Ensure maintenance of work spaces in a dry state for duration of work.

.2 Plan dewatering systems considering:

- .1 Access to dewatering systems and access to reach any portion of Work dewatered areas. Sequence of Work.
- .2 Space required for crews to work in dewatered areas
- .3 Sequence of Work.
- .4 Water levels.
- .5 Potential groundwater inflows.
- .6 Drainage areas and patterns based on pre-construction topography and construction design.
- .7 The direction of sediment-laden run-off to detention or retention facilities on-site.
- .8 Adherence to water quality standards.
- .9 Environmental regulations and requirements.
- .10 The potential for high turbidity water and the possible need to pre-filter water prior to discharge to settling basins.

.3 At all times, maintain environmental quality of water to Section 01 35 43 –ENVIRONMENTAL PROCEDURES.

.4 Ensure that no phase of Work threatens safe performance of stoplogs and additional dewatering systems.

.5 Provide a minimum of 300 mm freeboard above the normal navigation season levels, and the return period water elevation for the construction as applicable.

1.7 WATER LEVELS

.1 Refer to Section 01 11 00 – SUMMARY OF WORK.

.2 There may be considerable ponding in low areas, particularly in depressions in the bedrock.

.3 The work spaces are to be dewatered and maintained in the dewatered condition as part of the work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Dispose of water so that it does not create a safety or health hazard; or cause damage to environment, to adjacent property or to any portion of Work.

.2 Refer to Section 01 35 43 – ENVIRONMENTAL PROCEDURES.

.3 Do not release any sediment or other materials into watercourse during construction or removal of cofferdams.

.4 A "Permit to Take Water" should not be required. If the permit is required, it must be obtained from the Ontario Ministry of the Environment by the contractor.

.1 If cofferdam installation is required beyond the date stipulated in Section 01 14 00 –Work Restrictions, a request for changes to timing windows for in-water work must be submitted to OMNRF, if not previously approved.

.2 PCA will submit preliminary plans to OMNRF on behalf of contractor; however, contractor shall submit detailed plans regarding staging, installation and removal dates of cofferdams, diversion plan, and mitigating measures to prevent sediment from entering the watercourse.

.5 Provide settling facilities as per approved Environmental Management Plan (EMP) to remove suspended solids before discharging water into storm sewers, water courses or drainage areas. In the event that space restrictions make settling facility size inadequate, the contractor must provide alternate means of filtering/treating water prior to discharge.

.6 Monitoring and reporting of discharge water from dewatering is required by the contractor.

.1 Suspended Solids: The total suspended solids concentration in water discharged into surface water bodies should contain:

.1 <25 mg/L of suspended solids above background levels of the receiving waters during any short-term exposure

period (e.g., 24-h).

.2 <5 mg/L of suspended solids above background levels of the receiving waters during longer term exposure (e.g., 30 days or more).

.3 If elevated turbidity beyond 25 mg/L from background levels for a short-term exposure is observed, Parks Canada will assess potential impact to the aquatic environment and additional mitigation measures may be required.

.2 Turbidity Standards: Water discharged into surface water bodies form dewatering should have a turbidity:

.1 <8 Nephelometric Turbidity Units (NTU) above background turbidity during short-term exposure periods not to exceed 24 hours.

.2 <2 Nephelometric Turbidity Units (NTU) above average background turbidity levels for long term exposure periods averaged over not more than 30 days.

.3 Monitoring of background turbidity levels will be required to assess turbidity increases due to construction activities.

.7 Remove all debris from the worksite upon completion of construction.

.8 Protect and monitor the water quality and minimize the undesirable impacts of the construction upon the environment in accordance with the Canadian Water Quality Guidelines for the Protection of Aquatic Life.

.9 Additionally, since there are cottages in the vicinity, potentially with drinking water intakes, Ontario drinking water quality guidelines cannot be exceeded (beyond parameters that currently exist) due to project activities

1.9 PROTECTION

.1 Protect dewatered work spaces from damage due to floods, rain, ice, snow or other adverse climatic conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 In good condition, approved by Departmental Representative and suitable tor their use in Work.

.2 Do not use materials which may cause environmental damage to waterway or to land at or near site.

.3 Materials and methods proposed for use in the dewatering structure improvements, and the dewatering systems, must be approved by PCA.

.4 If using sandbags, sand must be washed of fines before placing in water.

.5 Earth or granular materials are not acceptable for improving the water-tightness of the existing stoplog dewatering structures.

.6 Note that PCA prefers gravel/rock fill with rubber membrane, caissons, rubber dams, sheet piling, bolted pre-engineered frame-type structures, or other types of cofferdams which do not generate turbidity.

PART 3 - EXECUTION

3.1 GENERAL

.1 Evaluate, plan and execute work in an expert and prudent manner giving due consideration to:

- .1 Climatic conditions which may occur at work location during period of doing work in its entirety.
- .2 Safety of personnel and of general public.
- .3 Safety of work and of adjacent property.
- .4 Safety of removals.
- .5 Environmental requirements.
- .6 Clearance requirements for work.
- .7 Changes in water levels.

.2 Contractor will have the option to use the existing stoplogs for dewatering and diversion purposes.

3.2 DEWATERING

.1 Stoplogs to be installed to coping elevation.

.2 When existing structures are incorporated into the dewatering system, the Departmental Representative does not guarantee the water-tightness of the structures. Contractor shall take additional measures to increase the water-tightness of existing structures.

.3 Design, supply and install any additional methods and materials required to maintain the site in dry condition.

.4 The contractor may improve the water-tightness of the stoplogs in the dewatering structure with plastic sheeting, burlap bags or similar material.

.5 Dewater work spaces and maintain them in a fully dewatered state until work is finished.

.6 Continue dewatering operations, to enable work to proceed in the dry, for duration of work.

.7 Ensure that any drawdown of the water surface due to pumping does not affect:
- .1 Climatic conditions which may occur at work location during period of doing work in its entirety. The safety or quality of the work.
- .2 Neighbouring property in an adverse manner.
- .3 The stability of soils.

.8 Intersect water draining from adjacent soil and bedrock due to lowering of the water table. Remove it from the work spaces. Prevent the loss of fines from adjacent soil. The dewatering systems must prevent seepage pressure on foundation soils which would disturb the soil and reduce the bearing capacity.

.9 Repeat entire dewatering procedure as often as may be necessary if flooding or other damage occurs before completion of work.

3.3 WATCHKEEPERS

.1 Ensure continuity of dewatering by designating a watchkeeper to make periodic checks at times when work is not in progress. Watchkeeper's qualifications under this Section are to be sufficient to perform, on dewatering equipment, such duties as:
- .1 Preventive maintenance and refuelling of generators normally performed during any shift.
- .2 Emergency repairs of minor complexity.
- .3 Placing standby items in service.

3.4 EQUIPMENT

.1 General:
- .1 Provide equipment in safe operating condition and maintain it in a safe operating condition for entire period of use and/or standby for use on work.
- .2 Provide skilled operators for equipment.

.2 Standard and Performance:
- .1 Provide equipment of such quality and in such quantity as to provide sufficient capability to perform essential functions of work.
- .2 Provide standby replacement for pumps and other essential dewatering equipment which may break down during work.
- .3 Keep this replacement equipment available on site for immediate use.

3.5 DEWATERING REMOVAL

.1 At approved stages in work remove all materials, temporary structures, and dewatering systems used to improve the water tightness of the stoplogs in the

dewatering structure; any additional temporary structures; and dewatering systems.

3.6 CLEAN UP AND RECTIFICATION

.1 Clean the sill excavation of accumulated silt, debris and other materials deposited as a result of the contract activities.

.2 Dispose of all unwanted materials in an approved manner off site.

.3 Do not dispose of any materials into the surrounding forest or water courses.

.4 All waste described as subject to Regulation 347, Environmental Protection Act, must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved by the Ontario M.O.E. to accept the waste.

END OF SECTION