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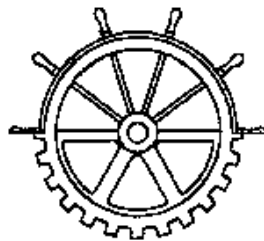
SPECIFICATIONS FOR
Trent-Severn Waterway
Kennisis Lake Dam
Replacement

Project No. R.065660.001

Ref. No. COTSW 14-R9

April 22, 2015

Prepared by:



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PROJECT TITLE Kennisis Lake Dam Replacement

PROJECT NUMBER R.065660.001

PROJECT DATE 2015-04-22

END

<u>DRAWING NUMBER</u>	<u>TITLE</u>
.1	COTSW 14-R9 SHEET No. 100 - COVER PAGE
.2	COTSW 14-R9 SHEET No. 101 - EXISTING SITE PLAN, CONSTRUCTION STAGING, REMOVALS, DEMOLITION AND TEMPORARY WORKS
.3	COTSW 14-R9 SHEET No. 102 - NEW SITE PLAN
.4	COTSW 14-R9 SHEET No. 103 -GENERAL ARRANGEMENT, PLAN AND ELEVATIONS
.5	COTSW 14-R9 SHEET No. 104 - GENERAL ARRANGEMENT, SECTIONS AND DETAILS
.6	COTSW 14-R9 SHEET No. 105 - CONCRETE REINFORCING, FOUNDATION DETAILS
.7	COTSW 14-R9 SHEET No. 106 - CONCRETE REINFORCING, UPPER STRUCTURE DETAILS
.8	COTSW 14-R9 SHEET No. 107 - STEEL DECK PLAN, SECTIONS AND DETAILS
.9	COTSW 14-R9 SHEET No. 108 - STOP LOG SERVICE GAIN COVER, PLAN AND DETAILS
.10	COTSW 14-R9 SHEET No. 109 - STOP LOG MAIN GAIN COVER, PLAN AND DETAILS
.11	COTSW 14-R9 SHEET No. 110 - STOP LOG GAINS DETAILS
.12	COTSW 14-R9 SHEET No. 111 - GUARDRAIL DETAILS I
.13	COTSW 14-R9 SHEET No. 112 - GUARDRAIL DETAILS II
.14	COTSW 14-R9 SHEET No. 113 - CHAIN LINK FENCE DETAILS
.15	COTSW 14-R9 SHEET No. 114 - SAFETY SIGNAGE AND BOOM ANCHORAGE DETAILS
.16	COTSW 14-R9 SHEET No. 115 - REFERENCE DRAWINGS I
.17	COTSW 14-R9 SHEET No. 116 - REFERENCE DRAWINGS II

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PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Title and description of Work.
 - .2 Contract Method.
 - .3 Work sequence/planning.
 - .4 Contractor use of premises.
 - .5 Parks Canada Agency occupancy and operation.
 - .6 Alterations to existing site.
- 1.2 PRECEDENCE
- .1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.
- 1.3 RELATED SECTIONS
- .1 Section 01 14 00 - Work Restriction
 - .2 Section 01 33 00 - Submittal Procedures
 - .3 Section 01 35 43 - Environmental Procedures
 - .4 Section 01 41 00 - Regulatory Requirements
 - .5 Section 01 71 00 - Examination and Preparation
- 1.4 WORK COVERED BY CONTRACT DOCUMENTS
- .1 Work of this Contract comprises full demolition and reconstruction of Kennisis Lake Dam of the Trent-Severn Waterway (TSW), located in the Municipality of Dysart et al, County of Haliburton, approximately 30 km northwest of Haliburton; and further identified as PWGSC Project No. R.065660.001.
 - .2 The Construction Work includes but is not limited to the following:
 - .1 Developing work / staging areas;
 - .2 Public/recreational traffic control / detour (portaging access route);
 - .3 Designing and constructing temporary access roads;
 - .4 Sediment and erosion control, and other environmental protection;
-

1.4 WORK COVERED .2
BY CONTRACT
DOCUMENTS
(Cont'd)

(Cont'd)

- .5 Obtaining regulatory permits certificates of authorization and approvals;
- .6 Sheet pile cofferdam design, supply and installation and dewatering of work area, including maintenance of the dewatering system;
- .7 Designing and constructing water diversion work, including maintenance and operation of diversion system through construction project;
- .8 Protection of existing adjacent structures/properties and other works including embankments, during construction;
- .9 Preparation and implementation of a Emergency Response Plan (ERP), Operation/Monitoring/Surveillance Plan (OMS) for Contractor's temporary works;
- .10 Demolition of the existing rock fill / concrete encased / wood crib gravity dam structure;
- .11 Salvaging of the existing winches and other identified equipment;
- .12 Construction of the new concrete dam structure and related work;
- .13 River erosion protection;
- .14 Removal of water diversion system, temporary construction access roads and other temporary works;
- .15 Site reinstatement and restoration.
- .16 In addition, the work under this contract, the Contractor will also be responsible for:
 - .1 Design, approvals and monitoring work associated with the temporary works (construction access roads, water diversion system, dewatering, sediment control, etc...);

- .3 The Contractor shall supply all labour, equipment, and material to perform the work as described in the contract plans and specifications, and will retain qualified personnel to perform the work.

1.5 CONTRACT METHOD .1

- .1 Construct work under combined lump sum and unit price contract.
-

1.6 LOCATION OF
WORK

- .1 Kennisis Lake Dam is located at the uppermost reach of the Gull River watershed system, approximately 30 km northwest of Haliburton, Ontario. The legal location is: Lot 5, Concession III, Township of Havelock, Municipality of Dysart et al, Haliburton County, Province of Ontario.
- .1 Coordinates: N 45°12'56" W 78°39'47",
.2 Topographic Map: 031E02 (Haliburton),
.3 Access road: Kennisis Lake Rd via CR7

1.7 EXAMINATION OF
SITE

- .1 Visit site before submitting tender. Examine site, adjacent premises, means of access and egress, and investigate and be fully informed of the nature and extent of the work required, difficulties in performing the work, facilities available for delivery, placing, operating plant and for delivery of materials.
- .2 A mandatory site visit will be organized to allow Bidders to examine site, adjacent premises, and condition of existing structure(s) before submitting a bid.
- .3 Be completely familiar with every detail and intent of these specifications and scope of work to be performed, and regulatory requirements governing the Work.
- .4 The Contractor is advised that all elevations and dimensions shown on the plans are approximate only. The Contractor will be required to verify all existing dimensions and grades before preparing and submitting shop drawings and before planning and undertaking any construction work. The Contractor will immediately report all discrepancies, in writing, to the Departmental Representative.

1.8 COST BREAKDOWN

- .1 Within five (5) days of notification of acceptance of bid, provide the Departmental Representative with a cost breakdown for both lump sum and unit price items as outlined in Section 01 22 01. Submit prices for each line item for the unit of measure specified.
- .2 Submit breakdown in metric (SI) units.
- .3 Upon approval from the Departmental Representative cost breakdown will be used as basis for progress payments.

- 1.9 WORK BY OTHERS .1 The Contractor shall for the purpose of the Ontario Occupational Health and Safety Act and Regulations for Construction Projects, and for the duration of the Work of the Contract:
.1 Assume the role of Constructor in accordance with the Authority Having Jurisdictions.
- 1.10 WORK SCHEDULE .1 Within fifteen (15) days of award of the Contract, provide the Departmental Representative with a copy of the Construction Schedule and estimated Cash Flow corresponding to the construction schedule.
.2 The Construction Progress Schedule is to be prepared in accordance with Section 01 32 16.
.3 Commencement of work will not be permitted until master plan and detailed schedule, as detailed in Section 01 32 16 - Construction Progress Schedule - Critical Path Method (CPM), has been reviewed and accepted by the Departmental Representative, and revised and resubmitted by the Contractor, as required.
.4 Provide a schedule for the submission of shop drawings, plans and procedures.
.5 If progress of work should fall behind, take steps required to bring work back to schedule. Do not change schedule without Departmental Representative's approval.
.6 Site work is not permitted before August 17, 2015.
- 1.11 CONTRACTOR'S TECHNICAL SUPPORT TEAM .1 Within five (5) days of acceptance of bid, submit a list of design engineers and specialists that will support Contractor to deliver the project.
.2 Contractor's Technical Support Team must include (but not limited to):
.1 Environmental Specialist
.2 Health and Safety Specialist
.3 Hydraulic/Civil Engineer (Diversion System)
.4 Dam/Structure/Geotechnical Engineer (sheet piling, dewatering works etc)
-

- 1.12 WORK PLANNING .1 Construct Work in stages to accommodate Owner's continued requirement to pass specified flow downstream of construction site during construction and to minimize interference with the operation of the water management of the TSW by Parks Canada Agency.
- .2 Plan and schedule in-water work and any tree removal work as to not interfere with restricted time periods as outlined in Section 01 14 00.
- .3 Maintain/protect all structures, services and utilities throughout the work. Undertake services relocation to the requirement of the local authorities.
- .4 Construct work in stages to provide for a continuous public use of specified areas and access to the lake during navigation and non-navigation seasons. Do not close off public usage of facilities until use of one stage of work will provide alternate usage.
- .1 Boat ramp access downstream of existing structure to be accessible for public during navigational season.
- .2 Contractor to provide a portage route (trail) during navigation season.
- .5 Required Stages:
- .1 Installation of diversion system.
- .2 Construction of access roads upstream and downstream (the later if deemed needed by Contractor).
- .3 Installation of upstream sheet piling for cofferdam / foundation and cut-off walls.
- .4 Partial demolition of downstream section of existing structure.
- .5 Installation of downstream sheet piling for foundation.
- .6 Demolition of existing remaining structure.
- .7 Foundation construction.
- .8 New sluice way structure and wing walls construction.
- .6 Ensure fire access / control to work area and adjacent properties are maintained at all time.
-

1.13 CONTRACTOR
USE OF PREMISES

- .1 Contractor has unrestricted use of site for the purpose of construction, as defined by the Construction Limit, until Substantial Performance of the Work.
- .2 Site is not available to the Contractor until August 17, 2015.
- .3 Confine work, including temporary structures, plant, equipment and materials to established Construction Limit, unless otherwise agreed to in writing by the Departmental Representative.
- .4 Coordinate use of premises under direction of PCA with Departmental Representative.
- .5 Obtain and pay for use of additional off site storage or work areas needed to carry out the work under this Contract. Provide copy of formal agreement with the landowner to the Departmental Representative. Furthermore, at completion of the work, provide copy of landowner release letter stating the all land use agreement conditions have been met.
- .6 Locate temporary buildings, access roads, drainage facilities, services and utilities as approved by the Departmental Representative and maintain in clean and orderly manner.

1.14 WATER
MANAGEMENT AND
CONTROL

- .1 PCA will continue their responsibility of water management and control on the TSW throughout the duration of the construction period. PCA will instruct the Contractor on water control issues.
 - .2 The Contractor will operate the water diversion system to control the water levels of the upper reach of the dam in accordance with PCA instruction. Refer to Section 01 14 00 Work Restrictions and Section 35 20 22 Dewatering and Diversion. Responsibilities will include (but not limited to):
 - .1 Record keeping of the diversion system operations including, but not limited to, upstream and downstream water levels.
 - .2 Contractor be available on a daily basis for water control (including weekends and statutory holidays) with the response time of 6 hours maximum.
-

1.14 WATER
MANAGEMENT AND
CONTROL

(Cont'd)

- .3 Unless otherwise instructed the Contractor is to maintain the water levels within the dam operating range. The Contractor is not to allow the water levels to go above or below set operating range without prior authorization from PCA.
- .4 In order to take advantage of the reservoir effect of Kennisis Lake, and minimize impact of high flows on the diversion system, the Contractor is to actively attempt to keep the water levels during navigation and outside of the navigation season near the lower end of the operating ranges.
- .5 Sequence of handover of water control operations:
 - .1 PCA will continue the water control operations on the existing dam until the work on the water diversion system is completed, commissioned and ready for operation.
 - .2 The Contractor is to carry out water control operations on the water diversion system until the work on the new dam has been completed, commissioned and accepted by the Departmental Representative, and PCA has taken over the dam structure.
- .6 The Contractor is to install necessary water monitoring equipment to assist with water management. As a minimum the following equipment shall be supplied:
 - .1 Staff gauge, installed in calm water, upstream of the diversion system entrance. The size of markings on the gauge are to be such that it can be easily read from the water diversion control structure.
 - .2 Staff gauge, installed in calm water, downstream of the construction area. The size of markings on the gauge are to be such that it can be easily read from the shore or temporary downstream access road.

1.15 COMMUNICATION
PROTOCOL

- .1 Due to nature of the work of on going water management and control issues, a communication protocol will need to be established between the Departmental Representative, the Contractor and PCA, prior to commencement of work.

1.15 COMMUNICATION .2
PROTOCOL
(Cont'd)

In general terms the Communication Protocol will address:

- .1 daily communication related to water management and control;
- .2 communication related to urgent safety concerns;
- .3 communication related to scheduled and unscheduled Contractor or PCA operation activities;
- .4 communication related to construction and contract issues;
- .5 communication with the general public.

1.16 RECORD .1
DRAWINGS

As work progresses, maintain accurate records to show deviations from contract drawings. Submit one (1) set of record drawings just prior to the Departmental Representative's inspection of the work for the issuance of the Final Certificate of Completion.

1.17 SIGNS .1

Provide common use signs related to traffic and navigation control, information, instruction, use of equipment, public safety devices, etc, in both official languages or by the use of commonly understood graphic symbols to the Departmental Representative's approval.

- .2 No advertising will be permitted on this project.

1.18 REGULATORY .1
REQUIREMENT

Fee Permits, Certificates: Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of authority having jurisdiction.

- .2 The submission of a tender will be construed as the Tenderer's declaration that they have discussed the approval requirements with the appropriate levels of government. All costs incurred by the Contractor associated with compliance with Section 1.19 will be borne by the Contractor. The Contractor will not make any claim for additional compensation due to delays on commencing work due to compliance with the above.
-

- 1.19 DOCUMENTATION .1 Maintain on site, one copy of each document as follows:
- .1 Work Permit,
 - .2 Contract Drawings,
 - .3 Specifications,
 - .4 Addenda,
 - .5 Reviewed Shop Drawings,
 - .6 List of Outstanding Shop Drawings,
 - .7 Change Orders,
 - .8 Field Test Reports,
 - .9 Copy of Approved Work Schedule,
 - .10 Site Specific Health and Safety Plan,
 - .11 Other related documents as specified herein.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

- 1.1 USE OF SITE AND FACILITIES
- .1 Execute work with least possible interference or disturbance to normal use of adjacent premises. Make arrangements with Departmental Representative to facilitate work as stated.
 - .2 Site work is not permitted before August 17, 2015.
- 1.2 ADVERTISING
- .1 No advertising will be permitted on this project.
 - .2 The Contractor is not allowed to advertise this project on any website or in publications without permission from PWGSC.
- 1.3 EXISTING SERVICES
- .1 Notify, Departmental Representative, utility companies of intended interruption of utilities or services and obtain required permission where applicable to site.
 - .2 Where work involves breaking into or connecting to existing services, give Departmental Representative forty-eight (48) hours of notice for necessary interruption of electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
 - .3 Provide for personnel, pedestrian, boat and vehicular traffic control.
 - .4 Construct barriers in accordance with Section 01 56 00.
- 1.4 ENVIRONMENTAL RESTRICTIONS
- .1 Section 01 35 43 - Environmental Procedures lists environmental restrictions, including in water work restrictions, and time frames that need to be considered in the planning of the work.
-

1.4 ENVIRONMENTAL
RESTRICTIONS
(Cont'd)

- .2 Maintain existing flow pattern for the Kennisis Lake Dam throughout the project period as directed by PCA.
 - .1 Diversion system discharge to be capable of minimum environmental discharge requirements between 0.1 to 0.15 m³/s (cubic meters per second). This shall be maintained during construction of steel sheet pile cofferdam and diversion system.
 - .2 Minimum flow shall be correlated with average flows expected during cofferdam construction time frame.
- .3 Undertake Work in open water of the Kennisis Lake outside the fishery spawning window. In-water and work adjacent to the open water is to be done in accordance with Section 01 35 43.
- .4 Tree cutting and clearing work is not to be undertaken during the migratory bird nesting season, between May 1 and July 31. Tree cutting and clearing work is to be done in accordance with Section 01 35 43 and Section 31 11 00.

1.5 ROAD
RESTRICTIONS

- .1 Minimize traffic along access road and maintain safe speeds in accordance to local authorities regulations.
 - .2 Limit transportation activities from 08:00 to 17:00 hours.
 - .3 Where work involves disruption to and rerouting of vehicular traffic, provide Departmental Representative with a Traffic Control Plan to the requirement of the local authorities and the standards set out in the Ontario Traffic Manual Book 7, Temporary Conditions.
 - .4 Provide a minimum of four (4) weeks formal notification for alterations to the local road access to the local authorities, emergency services, Canada Post and residents.
 - .5 Install road closure and construction advertising signs, two (2) weeks in advance of planned access changes.
-

1.6 REGIONAL ROAD
AND AREA BRIDGES
LOAD RESTRICTIONS

- .1 County Road 7/Kennisis Lake Road
(Municipality of Dysart et al)
- .1 Note, there are three small bridge crossings along Kennisis Lake Road, and the Regional Municipality of Dysart et al has confirmed that there are no load restrictions on all three of them.
- .2 Half-load season on Kennisis Lake Road runs from March 1st to May 15th.

1.7 SPECIAL
REQUIREMENTS

- .1 Carry out noise generating Work Monday to Friday from 07:00 to 18:00 hours.
- .2 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANNT) Chart.
- .3 Through the direction of the PCA Water Management Group, maintain water levels on the Kennisis Lake and Kennisis River for navigation and other seasonal requirements through operation of the diversion structure.
- .4 Coordinate any operation of the diversion system control structure with the Trent Severn Waterway operator to permit manipulation of the downstream water control structure located at Red Pine Lake. Failure to do so could result in unacceptable water flows and levels, and possibly flooding of the downstream reach.
- .5 Blasting for demolition and rock excavation is prohibited.

1.8 CONTRACTORS
USE OF DEWATERED
AREA

- .1 Contractors use of the dewatered area is limited for the sole purpose of construction activity. The dewatered area shall not be used for:
- .1 the Contractor's construction camp or staging area, including site washroom facilities, and workers parking area;
- .2 fuel storage or refueling station;
- .3 storage of machinery, equipment or material; and
- .4 the Contractor's sediment trap, unless approved by the Departmental Representative and that all environmental protection regulations can be met.

1.8 CONTRACTORS
USE OF DEWATERED
AREA

(Cont'd)

- .2 All equipment and machinery used within the dewatered area are in good working condition and free of fuel, lubricants, coolant and other deleterious material that could enter the water body.

1.9 WATER LEVELS

- .1 The Trent-Severn Waterway is operated from downstream to upstream; stop logs at each structure are manipulated to provide the desired water level.
- .2 At a time determined by the Parks Canada Agency, the stop logs are placed in the various structures to allow the reaches to fill naturally during the spring freshet to the navigation season levels. The latest date the Trent-Severn Waterway is filled is May 14th.
- .3 The general practice for Kennisis Lake Dam is to draw lake level down in late September so by September 30, there are 3 logs in (0.91 m above sill), which is the minimum log and corresponding water level setting . Starting anytime from January to March (pending on snow pack) logs are gradually installed to maximum 9.5 logs (2.9 m above sill) and lake levels increased to a maximum log and corresponding water level setting.
- .4 Regulated water level range for Kennisis Lake: El. 372.16 m to 374.15 m corresponds to 3 to 9.5 logs in. The maximum recorded level is 374.3 m.
- .5 Daily water level variation graphs, together with historical high and low water levels can be seen on the following at:
http://www.pc.gc.ca/lhn-nhs/on/trentsevern/vit/ne-wl/trent_e.asp.
- .6 The contractor is solely responsible for making their own interpretation of the data included herein, and any received from the Agency.
- .7 The contractor is cautioned that, while the Trent-Severn Waterway / Parks Canada Agency endeavours to manage the water levels within the indicated ranges, it cannot be held responsible for events, or the result of events, that are not under its control.
-

- 1.10 HOURS OF WORK .1 The normal hours of work are Monday to Friday from 7:00 until 19:00 hours. Night shift is not allowed.
- .2 The Contractor is not to work during the weekend and public holiday without prior authorization from the Departmental Representative. When weekend work is authorized the hours of work shall be limited to 7:00 until 19:00 hours on Saturdays and 10:00 until 19:00 hours on Sundays and public holidays.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 This section provides a list of work items that needs to be covered under the Contract Lump Sum Price and the procedures for payment that will be applied to these work items.
 - .2 This section covers the measurement of work for payment purposes, and the scope of work included in the pay items in the Unit Price Table.
- 1.2 LUMP SUM PRICE ITEMS
- .1 Lump Sum Price - All Work other than that which is specifically designated in the Unit Price Table, shall be included in Contract Lump Sum Price. This item includes all costs to undertake the Work.
 - .2 The items of work listed below are not intended to be complete, but are provided to give an indication to the Contractor how the Contract Lump Sum Price will be broken down for payment purposes. As such, it is the Contractor's responsibility to ensure that all items of work not covered under the Unit Price Table are covered in the Contract Lump Sum Price.
 - .3 Items of work to be considered in the Contract Lump Sum Price are, but not limited to:
 - .1 Mobilization/Demobilization (Payment Group 1), including:
 - .1 general site preparation, clearing and grubbing, soils stripping etc;
 - .2 general maintenance and cleaning of work site, site access, and haul routes;
 - .3 site security;
 - .4 snow removal;
 - .5 construction control and monitoring;
 - .6 temporary utilities;
 - .7 temporary facilities;
 - .8 Contractor's and Departmental Representative's Site Office;
 - .9 construction fencing and perimeter security measures around work area;
 - .10 shop drawings;
 - .11 submittals, approvals, permits and fees (other than specified below);
 - .12 close-out submission;
-

- 1.2 LUMP SUM PRICE .3 (Cont'd)
ITEMS .1 (Cont'd)
(Cont'd)
-
- .13 other items in Contract Documents that are noted as being included in Lump Sum Price;
- .2 Environmental Protection (Payment Group 2), including:
- .1 temporary drainage, sediment and erosion control and treatment at work area, construction, maintenance and removal, for items such as silt fencing around staging area(s), etc.;
- .2 dust and noise management;
- .3 control work to provide effective environmental water body protection such as turbidity curtain(s), etc.;
- .3 Temporary Construction Access Roads (Payment Group 3), including:
- .1 design and approvals and construction and deconstruction of temporary works for access to upstream and downstream work areas;
- .4 Water Diversion System (Payment Group 4), including:
- .1 design and approvals, construction, maintenance, operation (including record keeping), deconstruction and full land restoration (including backfilling, fine grading and vegetation restoration);
- .5 Excavating and Backfilling (Payment Group 5), including:
- .1 excavation of work area as required, including hauling, stockpiling, backfilling and disposal.
- .6 Demolition (Payment Group 5), including:
- .1 removal and disposal of existing dam, cut-off walls and associated works;
- .7 Salvage (Payment Group 6), including:
- .1 removal, storage, re-installation of designated items, including transportation to and from Parks Canada compound in Haliburton, ON;
- .8 Concrete Works (and associated works, excluding miscellaneous steel embedded components) (Payment Group 5), including:
- .1 foundation;
- .2 piers;
- .3 wing walls;
- .4 cut-off walls;
- .9 Metal/Steel Work (Payment Group 7), including:
- .1 gain liner;
- .2 sill beam;
- .3 deck framing;
-

- 1.2 LUMP SUM PRICE .3 (Cont'd)
ITEMS .9 (Cont'd)
(Cont'd)
- .4 deck grating including gain covers and log sliders;
 - .5 railing including chain link fencing;
 - .6 other miscellaneous steel fabrications items;
 - .10 Dam Safety Signage Installation (Payment Group 7), including:
 - .1 all safety signage installation, as supplied by PCA;
 - .2 supply of all materials required for signage support and installation;
 - .11 Safety Boom Installation (Payment Group 7), including:
 - .1 installation of safety boom assembly, including in-water and shore anchors (permanent);
 - .2 supply of all materials required for safety boom installation;
 - .12 Equipment Mobilization/Demobilization for Steel Sheet Piling Installation (Payment Group 8) will be based on fixed lump sum price tendered under this item.
 - .13 General Landscaping (Payment Group 5), including:
 - .1 rough grading and subgrade preparation;
 - .2 all the work described in Section 32 94 00;
- 1.3 CONTRACT LUMP .1 Items of Work will be paid within Contract
SUM PRICE WORK .1 Lump Sum Price at completion of the particular
ITEMS PAYMENT item of work, as set out below.
PROCEDURES
- .2 Payment Group 1
:"Mobilization/Demobilization" - 40% initial mobilization, 30% on completion of demobilization/acceptance of submittals, and 30% pro-rated over duration of contract.
 - .3 Payment Group 2 : "Environmental Protection" - 20% initial activities (program development and approvals/installation of measures/initial work), 10% removal of measures/reporting and 70% maintenance/monitoring pro-rated over duration of the work item.
 - .4 Payment Group 3: "Temporary Construction Access Roads" - 70% construction activity and 30% on completion of deconstruction work.
-

- 1.3 CONTRACT LUMP .5 Payment Group 4: "Water Diversion System" - 5%
SUM PRICE WORK .5 design and approvals, 50% construction
ITEMS PAYMENT .5 activities, 30% deconstruction activities, and
PROCEDURES .5 15% operation and maintenance activities
(Cont'd) .5 pro-rated over duration of diversion system
usage.
- .6 Payment Group 5: "Excavating and
Backfilling", "Demolition", "Concrete Works",
"General Landscaping" - 100% pro-rated over
duration of the work item. Work items with
multi-items may be broken into individual
items.
- .7 Payment Group 6: "Salvage" - 50% for removal
and storage, 50% for re-installation.
- .8 Payment Group 7: "Metal/Steel Work", "Dam
Safety Signage Installation", Safety Boom
Installation" - 100% on completion of work
item. Work items with multi-items may be
broken into individual items.
- . 9 Payment Group 8: "Steel Sheet Piling
Installation Equipment Mobilization/Demobilization"
- upon mobilization 65% of the fixed lump sum price
will be paid and the remaining 35% will be paid on
demobilization.

- 1.4 UNIT PRICE ITEM .1 Item No. 1 - Heavy Rip-Rap (erosion
MEASUREMENT .1 protection downstream and upstream).
AND PAYMENT .1 .1 Item No. 1 shall be paid at the contract
PROCEDURES .1 unit price by the unit tonne (1000 kg).
.2 This item shall include all work
described in Section 31 37 10 related to
supply and installation of heavy rip-rap.
.3 Quantities and Payment for this item
shall be based on truck tickets and materials
placed within the designated work area
including any material consolidation to the
required depth and extent.
- .2 Item No. 2 - Steel Sheet Piles.
.1 Item No.2 shall be paid at the
contract unit price by the unit square
meter of steel sheet piling remaining in
place after cut-off.
.2 This item shall include all the
work described in Section 31 62 16 with
exception of mobilization and
demobilization of equipment for
installation of steel sheet piling.
-

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE
- .1 Project meeting will be scheduled at a maximum of one (1) month intervals throughout the progress of the work and at the call of the Departmental Representative.
 - .2 The Contractor is to provide physical space and make arrangements for the meeting.
 - .3 The Departmental Representative will preside over the meetings.
 - .4 Representative(s) of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents, must be present as requested by Departmental Representative.

- 1.2 PRE-CONSTRUCTION MEETING
- .1 Within 15 days of Contract award, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
 - .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
 - .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
 - .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
 - .5 Agenda to include:
 - .1 Appointment of official representatives and their backups of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16
 - .3 Schedule of submission of shop drawings, samples, etc.. Submit submittals in accordance with Section 01 33 00 Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, portable toilets, utilities, fences in accordance with Section 01 52 00 Construction Facilities.
 - .5 Schedule of submission of the Site Specific Health and Safety Plan in accordance
-

1.2
PRE-CONSTRUCTION
MEETING
(Cont'd)

- .5 Agenda to include:(Cont'd)
 - .5 (Cont'd)
with Section 01 35 29 Health and Safety Requirements, Site Specific Environmental Protection Plan in accordance with Section 01 35 43 Environmental Procedures.
 - .6 Site security in accordance with Section 01 56 00 Temporary Barriers and Enclosures.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, work hours, administrative requirements.
 - .8 Owner provided products.
 - .9 Record drawings in accordance with Section 01 33 00.
 - .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.
 - .11 Monthly progress claims, administrative procedures, photographs, hold backs.
 - .12 Appointment of inspection and testing agencies or firms.
 - .13 Insurances, transcript of policies.

1.3 PROGRESS
MEETINGS

- .1 During course of Work and two weeks prior to project completion, schedule progress meetings on bi-weekly basis.
 - .2 Contractor, major Subcontractors involved in Work, Departmental Representative and Parks Canada Project Manager are to be in attendance.
 - .3 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Health and Safety issues and concerns.
 - .4 Environmental Protection issues and concerns.
 - .5 Water control and diversion operations.
 - .6 Field observations, including monitoring reports, problems, conflicts.
 - .7 Problems which impede construction schedule.
 - .8 Review of off-site fabrication delivery schedules.
 - .9 Corrective measures and procedures to regain projected schedule.
 - .10 Revision to construction schedule.
 - .11 Progress schedule, during succeeding work period.
-

- 1.3 PROGRESS MEETINGS (Cont'd)
- .3 Agenda to include the following:(Cont'd)
- .12 Review submittal schedules: expedite as required.
 - .13 Maintenance of quality standards.
 - .14 Review proposed changes for affect on construction schedule and on completion date.
 - .15 Cost/schedule claims.
 - .15 Other business.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not Used.

END

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
-

- 1.1 DEFINITIONS .9 (Cont'd)
(Cont'd) monitoring of project work in relation to established milestones.
- 1.2 PRECEDENCE .1 Division 1 Sections take precedence over technical specifications sections elsewhere in these specifications.
- 1.3 REQUIREMENTS .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 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.
- .5 Make allowance for obtaining of regulatory permits, other agency approvals, obtaining of additional lands for staging areas, receiving permission to temporarily relocate utilities, and establishing a waste management and disposal plan.
- 1.4 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 5 working days of receipt of acceptance of Master Plan.
-

- 1.5 KEY PROJECT DATES
- .1 Project milestones form interim targets for Project Schedule.
 - .1 At Kennisis Lake water levels are drawn down to the winter setting of 3 logs over sill (el. 372.16 m) by September 30th. The Trent-Severn Waterway does not have an exact date when the water levels are raised to full reservoir setting of 9.5 logs over sill (el. 374.15 m). As a practice this water level is typically restored by the end of April.
 - .2 Contractor must take these constraints and other constraints mentioned in Section 01 14 00 into considerations while developing the detailed project schedule and must show them as activities in the GANTT chart.
- 1.6 MASTER PLAN
- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
 - .2 Departmental Representative will review and return revised schedules within 5 working days.
 - .3 Revise impractical schedule and resubmit within 5 working days.
 - .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.
- 1.7 PROJECT SCHEDULE
- .1 Develop detailed Project Schedule derived from Master Plan.
 - .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Design submission of the temporary works
 - .4 Permits/DFO approval.
 - .5 Mobilization and site camp/staging area preparation.
 - .6 Environmental controls.
 - .7 Salvage of identified items/materials.
 - .8 Construction of diversion and erosion protection measures including safety boom.
 - .9 Construction upstream and downstream temporary construction access road.
 - .10 Sheet pile cofferdam construction including cut-off walls.
-

- 1.7 PROJECT SCHEDULE (Cont'd)
- .2 (Cont'd)
 - .11 Demolition and excavation work.
 - .12 Foundation construction.
 - .13 Structural concrete of dam wing walls and piers.
 - .14 Installation of steel deck, handrails and winch system.
 - .15 Structural concrete of cut-off walls.
 - .16 Backfill and erosion control work.
 - .17 Removals of diversion work and restoration.
 - .18 Installation of permanent fencing.
 - .19 Installation of dam safety and navigation safety signage.
 - .20 Installation of upstream and downstream boom assembly with anchors
 - .21 Removals of temporary construction access roads.
 - .22 Site and camp restoration including landscaping work.
 - .23 Restoration of staging areas including environmental testing as required.
 - .24 Inspection for completion of all work and issuing of Substantial Certificate of Completion.
 - .25 Other activities as specified by the Departmental Representative.
- 1.8 PROJECT SCHEDULE REPORTING
- .1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.
 - .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.
- 1.9 PROJECT MEETINGS
- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
-

- 1.10 PROGRESS .1 Project schedule reporting as described above
PAYMENT REQUEST is condition for Progress Payment release by
RELEASE the Departmental Representative.
- .2 Request for Payment must be submitted with
updated schedule.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

- 1.1 GENERAL .1 This section specifies general requirements and procedures for contractor's submissions of shop drawings, product data and samples to Departmental Representative for review.
- .2 Additional specific requirements for submissions are specified in individual sections of Divisions 01 to 32.
- 1.2 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 and submittal acceptance is confirmed.
- .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 Present calculation briefs containing all information required to support detailed
-

- 1.2 ADMINISTRATIVE (Cont'd) .8 (Cont'd)
design of structures as indicated in these specifications.
- .9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .11 Keep one reviewed copy of each submission on site.
- .12 Submit two (2) hard copies specified for each type of submittal and also submit in electronic format as pdf files. Forward pdf files through email or alternate means as specified by the Departmental Representative.
- 1.3 SHOP DRAWINGS AND PRODUCT DATA .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 5 working days for Departmental Representative's review of each submission.
- .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .5 Make changes in shop drawings as Departmental Representative may require, consistent with
-

1.3 SHOP DRAWINGS .5
AND PRODUCT DATA
(Cont'd)

(Cont'd)
Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

- .6 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.

- .7 Submissions shall include:
- .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of design, installation, performance verification and decommissioning of temporary and permanent works, including load bearing structures duly stamped by a professional engineer (with Canadian related experience to items of work being designed) as specified in the respective Sections including:
 - .1 Design methodology including criteria, assumptions, and standards.
 - .2 Calculations.
 - .3 Details.
 - .6 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.

- .8 After Departmental Representative's review and acceptance, distribute copies.
-

1.3 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .9 Submit three hard copies and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
 - .10 Submit three hard copies and one electronic copy 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.
 - .11 Submit three hard copies and one electronic copy 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 accordance with specified requirements.
 - .12 Submit three hard copies and one electronic copy 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.
 - .13 Delete information not applicable to project.
 - .14 Supplement standard information to provide details applicable to project.
 - .15 Verify field measurements and affected adjacent work are coordinated.
 - .16 Submit MSDS sheets as required in Section 01 35 29 - Health and Safety Requirements.
 - .17 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
-

1.3 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

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

1.4 SAMPLES

- .1 "Samples" means examples of materials, equipment, quality, finishes, workmanship.
- .2 Submit for review samples in duplicate as requested in respective specification sections. Label samples with origin and intended use.
- .3 If delivering samples to Departmental Representative's business address, courier must be prepaid.
- .4 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .5 Where colour, pattern or texture is criterion, submit full range of samples.
- .6 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 prior to proceeding with Work.
-

- 1.4 SAMPLES
(Cont'd)
- .7 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.
- 1.5 CERTIFICATES
AND TRANSCRIPTS
- .1 Immediately after award of Contract, submit Workers Safety and Insurance Board Experience Report.
- .2 Submit transcription of insurance immediately after award of Contract.
- 1.6 ELECTRONIC
FILES
- .1 When submissions are created electronically, the contractor is to make copies of all electronic records which are produced for the submissions listed in this section. This includes, but is not limited to, drawings, documents, and spreadsheet files.
- .1 All files are to be properly labeled and placed in a well organized folder structure.
- .2 The data is to be stored on a memory stick.
- .3 The following are the preferred file formats:
- .1 Drawings: AutoCAD version 2015 or latest version, or Adobe PDF.
- .2 Documents: MS Word or Adobe PDF.
- .3 Spreadsheet: MS Excel or Adobe PDF.
- .4 Product Sheets: Adobe PDF.
- .4 Three identical memory sticks containing all electronic records each, are to be submitted before the Certificate of Final Completion.
- 1.7 MEASUREMENT
FOR PAYMENT
- .1 The work covered by this section will not be considered separately for payment but will be considered as incidental to Work of the specification.
-

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

————— END —————

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Canadian Standards Association (CSA): Canada
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
 - .2 National Building Code 2010 (NBC):
 - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
 - .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS)
 - .4 Province of Ontario:
 - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and:
 - .1 Regulations for Construction Projects, O. Reg. 213/91 as amended.
 - .2 Regulations for Diving Operations, O. Reg. 629/94 as amended.
 - .2 Workplace Safety and Insurance Act, 1997.
 - .3 Municipal statutes and authorities.
 - .5 Fire Commissioner of Canada (FCC):
 - .1 FC-301 Standard for Construction Operations, June 1982.
 - .2 FC-302 Standard for Welding and Cutting, June 1982.

Labour Program
Fire Protection Engineering Services
4900 Yonge Street 8th Floor
North York, Ontario M2N 6A8

and copies may be obtained from:

Human Resources and Social Development Canada
Labour Program
Fire Protection Engineering Services
Ottawa, Ontario K1A 0J2

- 1.2 SUBMITTALS
- .1 Make submittals in accordance with Section 01 33 00.
 - .2 Submit site-specific Health and Safety Plan:
Within 7 days after date of Notice to Proceed
-

- 1.2 SUBMITTALS .2 (Cont'd)
- (Cont'd)
-
- and prior to commencement of Work. Health and Safety Plan must include:
- .1 Site-specific safety hazard assessment and measures to be taken to address the anticipated hazards.
 - .2 Contractor's and Sub-contractor's Safety Communication Plan. Must include contact information for all key contacts. Departmental Representative will provide contact information for other key government agencies.
 - .3 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. The portion of the ERP covering contingency issues for the construction and operation of the water diversion system is to be prepared in accordance to the 2007 Dam Safety Guidelines from the Canadian Dam Association. Coordinate plan with Parks Canada Dam Operations staff.
 - .4 Emergency Preparedness Plan (EPP) to be prepared by the Contractor for external use, defining hazards posed by the Contractor water diversion system, the role and responsibilities of all parties and notification to be made. The EPP is to be prepared in accordance with the 2007 Dam Safety Guidelines from the Canadian Dam Association. Coordinate plan with local municipalities and Provincial Authorities.
 - .5 Contractor's Health and Safety Policy.
 - .6 Name of Health and Safety Coordinator and his/her alternate.
- .3 If diving work is required, submit a separate site-specific Health and Safety Plan for Diving Operations, at least 7 days prior to commencement of diving work. Health and Safety Plan must include:
- .1 Site-specific safety hazard assessment and measures to be taken to address the anticipated hazards associated with diving work.
 - .2 Diving Contractor's and Contractor's Safety Communication Plan. Must include contact information for all key contacts.
 - .3 Contingency and Emergency Response Plan addressing standard operating procedures specific to the Diving Operations to be implemented during emergency situations.
 - .4 Diving Contractor's Health and Safety Policy.
 - .5 Name of Health and Safety Coordinator.
-

1.2 SUBMITTALS
(Cont'd)

- .4 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .5 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.
- .6 Submit records of Contractor's Health and Safety meetings or daily tailgate meeting for diving operations when requested.
- .7 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative monthly.
- .8 Submit Construction Safety Checklists after completion.
- .9 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .10 Submit copies of incident and accident reports.
- .11 Submit WHMIS MSDS - Material Safety Data Sheets to Departmental Representative.
- .12 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

1.3 FILING OF
NOTICE

- .1 File Notice of Project with Provincial authorities prior to commencement of Work.
 - .2 If project requires diving, a separate Notice of Project needs to be filed with Provincial authorities prior to commencement of work.
 - .3 Submit copies of Notice(s) of Project to the Departmental Representative.
 - .4 File all other required notices in accordance with Acts and Regulations of Province of Ontario.
-

- 1.3 FILING OF NOTICE
(Cont'd)
- .5 Keep copy of Notice of Project on site at all times.
- 1.4 MEETINGS
- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.
- 1.5 REGULATORY REQUIREMENTS
- .1 Comply with the Acts and regulations of the Province of Ontario.
- .2 Comply with specified standards and regulations to ensure safe operations at site.
- 1.6 PROJECT/SITE CONDITIONS
- .1 Work at site will involve contact with the following hazardous materials:
- .1 Silica in concrete (from the concrete demolition).
 - .2 Pressure treated lumber (existing timber deck of the dam).
 - .3 Bird droppings on the structure.
 - .4 Corroded metals.
 - .5 Benzene in fuel oil, paints and adhesives (for new materials).
 - .6 Lead (from paint on the existing railing on the dam).
- .2 Hazards on-site include but are not limited to:
- .1 Working near or under electrical wires.
 - .2 Working around moving equipment.
 - .3 Exposure to ATV or snowmobile traffic.
 - .4 Working near or above water.
 - .5 Icy surfaces.
 - .6 Falling hazards.
 - .7 Animals and pests.
 - .8 Extreme temperatures or weather conditions.
- .3 More specifically hazards associated with working near and on an operational dam include but are not limited to:
- .1 General hazard around dams structures:
 - .1 Low head weir poses considerable danger to workers on boats or floating work platforms. Underwater hydraulics at the base of these structure can trap and
-

1.6 PROJECT/SITE .3
CONDITIONS .1
(Cont'd)

(Cont'd)

.1 (Cont'd)

.1 (Cont'd)

drown workers who may fall in the water near them.

.2 Low head weirs may have no visible structure above water line. Workers on a boat or work platform approaching a weir from the upstream side may not be aware of the dangers present. Workers needs to always watch for and obey signs, safety boom and markers near these structures.

.3 Upstream leakage between and around stop logs may suck in a worker who may be in the water and hold him below the water level with such force that he cannot escape.

.4 Objects in foaming water are less buoyant than in still water. Air trapped in water reduces the buoyancy and therefore workers caught in such conditions have greater difficulty staying afloat even with the aid of personal flotation device.

.5 Changing water levels and flows below a dam or water diversion system can occur rapidly and without warning. Workers should never place themselves in a situation where they cannot leave area they boated in or have accessed by boat.

.6 Retaining walls and steep embankment above or below dams could block exit routes for workers trying to escape dangers associated with dams.

.7 During the winter months, workers need to be aware of thin ice that may develop near the dam due to operations of the dam or diversion system.

.8 Dam operations often result in lowering the water levels throughout the winter and spring, which can result in ice collapsing onto lower water levels and water seeping up under the snow resulting in slush conditions over the ice making travelling or movement difficult.

.2 Furthermore, in addition to the hazards described above, the following hazards exist at the site:

.1 The upstream safety boom is improperly located and may mislead workers in believing that they are in a safe location while working upstream of the dam.

.2 There is no downstream safety boom.

- 1.6 PROJECT/SITE .3 (Cont'd)
CONDITIONS .2 (Cont'd)
(Cont'd)
- .3 There is no system/anchor point in place for the workers to tie themselves off while working on the dam or the lock.
- .4 The areas immediately upstream and downstream are not fenced off thus allowing free access to these hazardous water areas.
- .5 Steep and slippery embankments can make accessing the downstream side of the dam hazardous.
- .6 The stop log lifting winches are the original winches for the dam, and have no safety features. Improper use of the winches could result in serious injuries.

- 1.7 GENERAL .1 Develop written site-specific Health and
REQUIREMENTS .2 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 Site-specific Health and Safety Plan needs to cover all sub trades utilized on the project, with the exception of diving operations, which require a separate site-specific Health and Safety Plan.
- .3 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 or requesting improvements.

- 1.8 COMPLIANCE .1 Comply with Ontario Occupational Health and
REQUIREMENTS .2 If diving is required, comply with Ontario Occupational Health and Safety Act, Regulation 629/94.
- .1 Comply with Ontario Occupational Health and Safety Act, Canada Labour Code Part II, and Canada Occupational Safety and Health Regulations.
- .2 If diving is required, comply with Ontario Occupational Health and Safety Act, Regulation 629/94.
-

- 1.9 RESPONSIBILITY .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act for the Province of Ontario.
- .4 Ensure a clear delineation in time and/or space between Parks Canada staff and Contractor's own forces such that Contractor shall maintain designation as "Constructor" as defined by the Occupational Health and Safety Act for the Province of Ontario.
- 1.10 UNFORESEEN HAZARDS .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.
- .2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.
- 1.11 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 similar dam reconstruction projects.
- .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.
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- 1.11 HEALTH AND SAFETY COORDINATOR (Cont'd)
- .1 (Cont'd)
- .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 Site Supervisor.
- 1.12 POSTING OF DOCUMENTS
- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
- .2 Provide documents as follows and post on site:
- .1 Contractor's Health and Safety Policy.
- .2 Contractor's (Constructor's) Name.
- .3 Notice of Project.
- .4 Name, trade, and employer of Health and Safety Coordinator.
- .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 Health and Safety Plan.
- .11 Copy of valid certificate of first-aid personnel on duty.
- .12 WSIB "In Case of Injury At Work" poster.
- .13 Location of toilet and cleanup facilities.
- .14 Any special handling or procedures specific to the site.
- .3 Comply with Provincial general posting requirements.
- 1.13 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.
-

- 1.13 CORRECTION OF NON-COMPLIANCE (Cont'd) .3 Departmental Representative may stop Work if a perceived non-compliance of health and safety regulations or a potential issue is perceived to have not been immediately corrected.
- 1.14 BLASTING .1 Blasting or other use of explosives is not permitted on this project.
- 1.15 POWDER ACTUATED DEVICES .1 Use powder actuated devices only after submittal of full justification for the requirement of their use and receipt of written permission from Departmental Representative.
- 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 to stop or start Work when, at Health and Safety Coordinator's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative or his/her designate may also stop Work for health and safety considerations.
- 1.17 EQUIPMENT LOCK-OUT/TAG-OUT .1 The Contractor shall coordinate and comply with Parks Canada/PWGSC lock-out/tag-out procedures for the equipment at the site. The more stringent of the Provincial Safety Regulation shall take precedence. The Parks Canada/PWGSC procedure involves a multi lock system.
- .2 Lock-out/tag-out procedures are to be followed when working with PWGSC on existing or new installations.
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PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This Section describes requirements for the protection of the environment that apply to the Work. These requirements apply to all Sections of this Specification, without limiting the conditions and approvals imposed by statute.
- .2 Control Work to provide effective environmental, water body and fish habitat protection. Departmental Representative will monitor environmental protection measures and will identify whenever such protection is found to be ineffective. Change protective measures or work procedures as directed by Departmental Representative.
- .3 Contractor to follow environmental mitigating measures as set out in the provided Detailed Environmental Impact Assessment for the Kennisis Lake Dam Replacement (DEIA) report. Report to be provided by Departmental Representative with Contract documents. Particularly, refer to Table 2.5, included at the end of this Section.
- 1.2 DEFINITIONS .1 "Environmental Pollution and Damage" - presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 "Environmental Protection" - prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
- .3 "Deleterious Materials" - any substance that, if added to a water body, could degrade water quality or impact fish, fish habitat and
-

1.2 DEFINITIONS
(Cont'd)

- .3 (Cont'd)
aquatic wildlife. This includes, but is not limited to:
- .1 Concrete dust.
 - .2 Soils (clay, silt).
 - .3 Oil, diesel or gasoline.
 - .4 Chipped or fresh concrete and admixtures.
 - .5 Alkali water resulting from fresh concrete or cementitious grout.
 - .6 Salt.
 - .7 Solvents.
- .4 "Drip line" - means the location on the ground surface directly beneath a theoretical line described by the tips of the outermost branches of the trees.

1.3 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .3 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .4 Environmental protection plan to include:
- .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 which identifies 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.
-

1.3 SUBMITTALS
(Cont'd)

.4

(Cont'd)

.6 Drawings showing 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 Provisions for protection of stockpile material, such as vegetating of material, for stockpile material that are to be inactive for a period exceeding 30 days are to form part of the erosion and sediment control plan.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Spill Prevention Plan: including location/procedures for storage and refuelling of all fuel and fuel operated equipment located near waterway. Fuel containers are to have secondary containment, overflow and spill protection. Fueling area is to be contained to address potential spillage. All heavy equipment used near waterway is to be in good condition. Any equipment that is leaking any fluid is to be removed from the site.

.11 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris. Where waste materials are not to be incorporated into the works and are to be disposed off-site at an approved landfill as part of the Solid Waste Management Plan, provide to the Departmental Representative a letter from the receiving station agreeing to accepting the waste material and Waste Site Certificate of Approval. Carry out disposal to the requirements on Ontario Regulation 347.

.12 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.13 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with

- 1.3 SUBMITTALS .4 (Cont'd)
(Cont'd)
- .13 (Cont'd)
Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .14 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction 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.
- .15 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .16 Noise Control Plan: including notifying local residents in advance of potential disruption from noise activities. Establish a communications protocol / plan acceptable to the Departmental Representative.
- .17 Flood Contingency Plan: identifying measures to be undertaken in the event of significant flows in the waterway. Measures to include storage of equipment and material out of the waterway that have not been secured or form part of the construction works.
- 1.4 FIRES .1 Fires and burning of rubbish on site are not permitted on this project.
- 1.5 DISPOSAL OF 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.
- 1.6 TURBIDITY CONTROL AND DRAINAGE WATER .1 Control turbidity of all water released during the Work.
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- 1.6 TURBIDITY
CONTROL AND
DRAINAGE WATER
(Cont'd)
-
- .2 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided.
- .1 Plan: 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.
- .3 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .4 Do not discharge water containing suspended materials into waterways or drainage systems. The Ministry of Environment has set a criteria wherein the allowable increase in total suspended solids (TSS) beyond background levels is 25 mg/l.
- .1 The Contractor shall provide a protocol and methodology for monitoring the total suspended solids from any discharge point (treated or untreated) to the watercourse at three locations i) upstream of the work area; ii) at the discharge area; iii) downstream of the work area, including: measurement location; depth from water surface; frequency of measurement.
- .2 After construction of any containment/treatment works, the Contractor shall demonstrate that the water quality is not impacted by their construction activities as established by the MOE criteria.
- .3 The Contractor shall modify their treatment of any discharge water from the construction operations to meet the MOE criteria.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- .6 Where any in-water work is approved, the work area shall be enclosed by a turbidity curtain (silt curtain) to prevent any sediment to escape the enclosed area. Turbidity curtains are to be installed and maintained as described in Section 35 49 25.
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1.7 SITE CLEARING
AND PLANT
PROTECTION

- .1 Protect trees and plants on site and adjacent properties where indicated.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
- .3 Protect roots of designated trees to drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.

1.8 MIGRATORY BIRD
PROTECTION

- .1 Tree cutting and clearing work is not to be undertaken during the migratory bird nesting season, between May 1st and July 31st.
- .2 If tree cutting and clearing work during the nesting season, a nest survey will need to be conducted by a qualified avian biologist immediately (within two days) prior to commencement of work to identify and locate active nests of species.
- .3 If active nest are present, the Contractor shall develop a mitigation plan to address any potential impact on migratory birds or their active nests. The plan will need to be reviewed by Environment Canada prior to implementation.

1.9 WORK ADJACENT
TO WATERWAYS

- .1 Do not use waterway beds for borrow material beyond the work area.
 - .2 Do not dump excavated fill, waste material or debris in waterways beyond the work area.
 - .3 Ensure all equipment and temporary access structures such as scaffolding placed in water bodies are in good working condition and free of debris, fuel, lubricants, coolant and other Deleterious Material that could enter the water body.
-

1.9 WORK ADJACENT TO WATERWAYS
(Cont'd)

- .4 Should site conditions at the site indicate that there are unforeseen negative impacts to fish or their habitat, all works shall cease until the problem has been corrected and/or any required input can be obtained from the Department of Fisheries and Oceans/Ministry of Natural Resources.
- .5 Any concrete wash water shall be directed to a collection basin or vegetated area to effectively remove all suspended solids, dissipate velocity and prevent Deleterious Material from entering the watercourse. Control turbidity of all water released to watercourse during work. In the event of silting or turbidity caused by construction activity, contractor shall stop work and install additional silt barriers as necessary to ensure watercourse is protected.
- .6 Stockpile excavated or fill materials must be stored and stabilized away from the water. Runoff from the excavated or fill material must be contained from entering the waterway.

1.10 IN-WATER WORK

- .1 In-water work is permitted from July 15th to September 30th. Any work outside this window would require an exemption from MNR. Contractor is responsible for preparing required application, related documentation and applying/obtaining such exemption.
- .2 Any amphibians, reptiles or fish that have been trapped between temporary construction access road and steel sheet pile cofferdam shall be salvaged and transferred "live" immediately upstream or downstream of the work. The work program shall be overseen and coordinated by a fisheries biologist to ensure proper capture and handling of fish. The biologist shall confirm that there are no species at risk (SAR). If encountered, DFO is to be notified immediately. Stop work. Review the protocol for the transfer of amphibians, reptiles or fish with DFO, and proceed with the transfer with the approval of DFO.

- 1.11 HAZARDOUS MATERIALS
- .1 Place materials defined as hazardous or toxic waste in designated containers.
 - .2 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources and Skills Development Canada, Labour Program.
 - .3 Store Hazardous Materials in secure areas on impermeable pads, provide berms if necessary.
- 1.12 CLEAN-UP
- .1 Clean-up work area as work progresses. At end of each work period, and more often if directed by the Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.
 - .2 Permit no undue amounts of debris, trash or garbage to accumulate.
 - .3 Do not bury rubbish on site.
 - .4 Separate and recycle all materials that can be recycled.
 - .5 Dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner by taking them to a special designated waste facility. Do not dump these into waterways, storm or sanitary sewers.
 - .6 Ensure all emptied containers are sealed and stored safely for disposal away from children.
 - .7 Spills:
 - .1 Report all spills immediately to the Departmental Representative and to the Ontario Spills Action Centre (Telephone No. 1-800-268-6060).
 - .2 Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal.
 - .3 Be responsible for all costs of cleaning up any spills to the satisfaction of the Departmental Representative.
 - .4 Provide and maintain an environmental emergency response plan in place and a spill kit readily available.
-

- 1.12 CLEAN-UP
(Cont'd)
- .7 Spills:(Cont'd)
- .5 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.
- .8 Remove all scaffolding, temporary protection and surplus materials, tools, plant, rubbish and debris and dispose of them in an approved manner off Crown property at the following times:
- .1 At the completion date of the work for all areas.
- .9 Clean areas under contract to a condition at least equal to that previously existing and to acceptance of Departmental Representative.
- 1.13 TRANSPORTING
WASTE MATERIALS
- .1 All waste subject to Regulation 558 of the Ontario Environmental Protection Act must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved by the Ontario Ministry of the Environment to accept that waste.
- .2 Be responsible for obtaining all Waste Generator Numbers, permits, manifests, and all other paperwork necessary to comply.
- 1.14 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/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be on site 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.
-

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

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not Used.

END

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
Fish/Fish Habitat (Fisheries Act)	Reduced fish biomass and diversity due to mortality from physical activities (e.g. pumping water) and or releases of deleterious substances	Kennisis Lake is a cold water fishery with populations of both Lake Trout and Brook Trout; as such the timing window for in-water work is restricted to September 30 to July 15; any work outside this window would require an exemption from OMNRF. OMNRF will need to review the detailed project proposal, both to determine whether a timing window exemption would be granted, any conditions PCA would need to meet set out by the OMNRF, and to screen the undertaking under OMNRF's Class Environmental Assessment for Resource Stewardship and Facility Development Projects (Van Allen, personal communications).	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	The potential exists to negatively impact fish in Kennisis Lake/River as a result of in-water construction activities. Negative impacts are expected to be avoided through the application of effective mitigation measures.
		Implement water quality protection measures to control releases of sediment and spills and leaks from equipment.				
		To prevent fish from being killed by the placement of rock in the waterway during construction, measures will be taken to scare and move fish away from the immediate area prior to dumping the rock. Methods could include: 1) utilize a combination of noise and bubbles from an air compressor for a sufficient amount of time to direct fish away from the area where rock will be dumped, 2) place both turbidity curtains side by side across the waterway, then pull one away pushing fish away from corridor, 3) drag a net through the waterway between the turbidity curtains and relocate fish outside the construction zone.				
		Any fish in the area to be dewatered must be captured alive and relocated outside cofferdam or work area prior to commencement of dewatering.				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
	Disruption of fish spawning and migration	Restrict in-water works to approved timing windows, as stated above unless exemption received from governing authorities.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied		Fish spawning may be disrupted as a result of construction activities in Kennisis Lake/River. Unless exemption is granted it is recommended that the MNRF approved timing window is adhered to.
	Physical changes to aquatic biota and habitat (e.g. change in water levels and flow volumes, damage or loss of riparian habitat, base flows and water temperature)	Implement mitigation measures in accordance with DFO recommendations, "Measures to avoid causing harm to fish and fish habitat" ³ . Restrict in-water works to approved timing windows, as described above unless exemption received from governing authorities.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Impacts to aquatic biota considered minor and temporary with the implementation of mitigation measures. Reconstruction and operation of the Dam is not anticipated to change water levels in Kennisis Lake/River in the long term. The mitigation measures will address potential impacts to habitat as long as the site is revegetated shortly after disturbance and the rehabilitation replaces as a minimum the vegetation impacted by this work.

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
Species at Risk (SARA)	There is the potential for encountering at least one species protected under the <i>Species At Risk Act</i> (SARA).	Should a SAR be encountered, cease work and contact EC for advice regarding mitigation measure(s) to be implemented to avoid destruction, injury, or interference with the species; as well as its residence, habitat, or both. Also, report all sightings immediately to PCA Resource Management Officer (705-750-4959). Distribute descriptions and illustrations of SAR so that workers can readily identify them. Incorporate procedures into contractor environmental protection plan.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	The potential exists for disturbance to SAR and SAR habitat as a result of Project activities. Negative impacts are expected to be limited through the application of effective mitigation measures.
	Temporary noise generated from the Project activities has the potential to disturb SAR.	Implement the mitigation measures for Noise appearing in this table.				
	Eastern Hognose-snake	<p>A survey should be conducted at the DIA Study Area in early spring (April or May) or in late fall by a qualified personnel that has looked for Eastern Hognose-snake before. If found, EC should be contacted with a proposed mitigation plan.</p> <p>Workers shall be educated by Parks Canada about the appearance and habitat of Eastern Hognose-snake, and they must report all sightings immediately to PCA Resource Management Officer (705-750-4959).</p>				
	Potential for Snapping Turtle to be disturbed by the Project activities	<p>To avoid potential impacts to Snapping Turtles, construction should occur from November 1 to April 30, outside the species' active season. If construction is required within this window, it is recommended that barriers (e.g., silt fencing) at wetland and watercourse boundaries be installed.</p> <p>Workers shall be educated by Parks Canada about the appearance and habitat of Snapping Turtles, and they must report all sightings immediately to PCA Resource Management Officer (705-750-4959).</p>				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
	Potential for Blandings Turtle to be disturbed by Project activities	To avoid potential impacts to Blandings Turtles, construction should occur from November 1 to April 30, outside the species' active season. If construction is required within this window, it is recommended that barriers (e.g., silt fencing) at wetland and watercourse boundaries be installed. Workers shall be educated by Parks Canada about the appearance and habitat of Blandings Turtle, and they must report all sightings immediately to PCA Resource Management Officer (705-750-4959).				
	Potential for Little Brown Myotis to be disturbed by Project activities	Workers shall be educated by Parks Canada about the appearance and habitat of the Little Brown Myotis, and they must report all sightings immediately to PCA Resource Management Officer (705-750-4959).				
Migratory Birds/Birds (MBCA)	Impact on birds/migratory birds through habitat disturbance due to construction activities.	Migratory birds, their nests and eggs are protected under the <i>Migratory Birds Convention Act, 1994 (MBCA)</i> . Project works or activities, such as, construction access, site grubbing, vegetation clearing and construction activities, are potentially destructive or disruptive activities to birds, their nests or eggs and should be avoided at key locations or during key periods, including the breeding periods and periods of high usage such as migration and/or feeding. These locations and periods vary by region and by species. Plan ahead to minimize the risk of detrimental effects to migratory birds by developing and implementing appropriate preventive and mitigation measures to minimize the risk of incidental take and to help maintain sustainable populations of migratory birds. General information about incidental take, avoidance, and how to work during the core periods of migratory bird breeding can be found at http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=1B16EAFB-1 Minimize any disturbance to onsite vegetation, including vegetation surrounding the construction staging area. Construction must be in compliance with the <i>MBCA</i> guidelines for tree clearing. The <i>MBCA</i> states that vegetation clearing will be undertaken outside of the breeding season. Clearing of vegetation in this region will be avoided from April 5 to August 31 (EC, 2014b).	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	The mitigation measures will address potential impacts to habitat as long as the site is revegetated shortly after disturbance and the rehabilitation replaces as a minimum the vegetation impacted by this work.

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		<p>To comply with the <i>MBCA</i>, if activities are proposed to occur between April 5 to August 31 (EC, 2014b) in any given year, a bird survey will be undertaken prior to the construction activities to check for nesting birds are located in the area. Should a nest be encountered, the area will be clearly staked or flagged and a buffer approved by the Canadian Wildlife Service (CWS) will be established around the nest to avoid disturbance of the area.</p> <p>The proponent should contact EC if they are proposing work during the breeding season to comply with the <i>MBCA</i>.</p>				
		To minimize land disturbance, the construction envelope will be clearly demarcated and kept as small as possible.				
		Establish staging areas and site access routes away from existing trees/naturalized vegetation to the extent possible.				
		All exposed soils will be stabilized and re-vegetated as soon as possible.				
Air Quality	Air quality degradation through dust and particulate emissions arising from construction and during transport of materials.	<p>Use soil removal methods and best practices to avoid generating airborne dust and particulates, including hand held tools.</p>	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Reversible</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration: <i>Short-term</i></p> <p>Frequency: <i>Continuous</i></p>	Insignificant when mitigation measures applied	No	Minor, temporary air emissions associated with dust and particulate during construction. Such effects are likely to be confined to the Project Study Area and are expected to be limited through the application of mitigation measures.
		Undertake misting, create localized wind barriers, and use tarps to cover loads or implement other methods particularly during dry, dusty conditions to avoid generating airborne or surface dust and particulates. Provide dust control (e.g. water) on access roads.				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		<p>Minimize the extent of disturbed areas and avoid leaving areas exposed over extended periods, to the extent practicable.</p> <p>Implement temporary erosion and sediment control measures and runoff conveyance structures as appropriate (for example, silt fence, straw bale or rock flow checks, temporary berms and grading, erosion prevention mats/covers) onsite. Maintain these measures until the site has stabilized.</p> <p>During construction, soil/rock fill should not be dumped under high wind conditions.</p>				
	Emissions generated from vehicles (for example, trucks) and/or equipment potentially degrading air quality.	<p>Maintain trucks, boats, and equipment in good condition, equipped with emission controls as applicable, and operated within regulatory requirements, including meeting the local authority's emission requirements.</p> <p>Avoid unnecessary idling of vehicles and equipment.</p>	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Reversible</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration: <i>Short-term</i></p> <p>Frequency: <i>Continuous</i></p>	Insignificant when mitigation measures applied	No	Minor, temporary air emissions associated with equipment usage, which are expected to be within acceptable limits. Such effects are likely to be confined to the Project Study Area and are expected to be limited through the application of mitigation measures.
Noise	Temporary noise generated from construction activities has the potential to disturb terrestrial biota, local residents, public, and employees working onsite.	<p>Conduct work during normal business hours and in accordance with the local noise By- Law.</p> <p>Ensure that equipment and vehicles are in good working order, are equipped with proper noise emission controls and that there is no excessive idling/running of vehicles and equipment.</p> <p>Monitor and mitigate any public complaints by keeping a record of complaints and addressing issues raised by the public should they arise.</p>	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Reversible</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration:</p>	Insignificant when mitigation measures applied	No	Minor, temporary noise generated by equipment usage, which are expected to be within acceptable limits. Effects are expected to be minimized through the application of mitigation

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		Avoid working during the breeding bird season, April 5 to August 31 (EC, 2014b). If work must occur during this time, avoid working during dawn and dusk when the birds are calling. A qualified avian biologist must survey work area (point count and nest search) for active nests and fence off buffer area as recommended by Environment Canada and protect the identified nests.	<i>Short-term</i> Frequency: <i>Continuous</i>			measures
Soils	Project activities will result in soil being disturbed and/or exposed to erosion processes including wind and surface water runoff.	To minimize land disturbance, the construction envelope will be clearly demarcated and kept as small as possible.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Construction activities will result in temporary disturbance and/or exposure of soil however impacts are expected to be limited through the implementation of mitigation measures.
		Stockpiled material away from watercourse and cover in order to prevent its erosion and transport. Ensure silt fences encompass stockpile areas.				
Potential contamination of soil in the DIA Study Area through spills of deleterious substances from machinery, chemicals stored within or adjacent to the DIA Study Area and/or vehicles		Maintain equipment in good working order to avoid leakage of fuels and liquids.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	There is the potential for accidental spills to occur during the Project however spills are expected to be avoided through the application of best management practices and mitigation measures and should a spill occur the application of appropriate cleanup related mitigation measures will minimize impacts to the environment.
		Operate and store all materials and equipment used for the Project in a manner that prevents any deleterious substance from being released to the ground.				
		Ensure that any construction vehicle entering the site are clean Prior to arrival on the site to remove any soil, organisms, or propagules from tires and undercarriages.				
		Refuel equipment off slopes, and 30 m away from any water body or aquatic habitats				
		Store all oils, lubricants, fuels, and chemicals in secure areas on impermeable pads, 30 m away from any water body, and provide berms if necessary.				
		Securely contain and remove any contaminated soils or other contaminated materials offsite to a licensed facility.				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		Ensure that absorbent materials are available onsite in the event that a spill of deleterious substances should occur. One fully maintained spill kit should be kept on site at all times. All spills and leaks of deleterious substances must be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre (1-800-268-6060), PCA Project Leader (613-530-3300) and PCA sector manager (705) 457-2632				
Surface Water	Reduced water quality and water clarity due to increased erosion, sedimentation, transport of debris or from point or non-point sources of pollution (for example, discharge of waters, leaks and accidental spills, contaminated groundwater inputs, inputs of contaminants from construction activities and from surface runoff)	<p>Cofferdams will be installed upstream and downstream of the existing Dam. Materials and methods for use in cofferdams must comply with the regulations and guidelines of the DFO³. Earth or granular materials with sand and fines is not acceptable, however, washed gravel with 6mm minimum aggregate size can be used for coffer dam construction. If using sand bags sand must be washed of fines before placing in water. Use gravel/rock fill with rubber membranes, caissons, sheet piling, frame type structures or other coffer dams that do not generate turbidity.</p> <p>Install marine grade turbidity curtains across waterbodies prior to any construction activity upstream and downstream of work site. The turbidity curtains to be anchored and weighted along length to form a continuous barrier with adequate flotation at water surface. Inspect daily and maintain turbidity curtains until the end of construction.</p> <p>Inspect all erosion and sediment control measures daily and leave them in place until the construction site has stabilized.</p>	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Reversible</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration: <i>Short-term</i></p> <p>Frequency: <i>Continuous</i></p>	Insignificant when mitigation measures applied	Yes	There is the potential for accidental spills to occur or debris to be released during the Project however these are expected to be avoided through the application of best management practices and mitigation measures and should a spill occur the application of appropriate clean up related mitigation measures will minimize impacts to the environment. Turbidity monitoring is also recommended to monitor turbidity levels in the Kennis River/Lake
		Silt fences will be installed around the perimeters of all work areas including staging areas to prevent sediment and other deleterious substances from entering the water or other surrounding areas.				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		<p>Prepare and implement a turbidity monitoring program for the duration of construction activities. Initial visual observation of turbidity should be conducted, followed by additional measures as required such as installing monitoring stations both upstream and downstream of each activity site. The turbidity monitoring program shall include trigger levels (relative to background/upstream conditions) for adjusting operations to minimize turbidity and also for work stoppage. Should increased turbidity levels or re-suspended sediments pose a hazard to sensitive natural habitats, PCA will be notified immediately.</p> <p>Prepare and implement a water monitoring/testing program for the duration of construction activities. The water monitoring program shall include trigger levels (relative to background/upstream conditions) where the water is monitored from just upstream and downstream of the construction. Should any differences in water conditions be noticed, PCA will be notified immediately.</p> <p>Minimize any runoff from stockpiles created through misting and wetting. Stockpiled or excavated materials will be stored well away from water and surrounded by sediment control measures to prevent runoff from entering waterbodies.</p> <p>Place only clean material free of silt and fine grained particulate matter in water.</p> <p>Rocks/stones used should not be taken from the bed or shoreline of any waterbody. Do not use waterway beds for borrow material</p> <p>Implement wet weather restrictions to activities</p> <p>Upon completion of work, completely remove all debris on the Lake bed and restore the area to its original use.</p>			No	
		Stabilize slopes as appropriate for DIA Study Area conditions				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		<p>Do not operate heavy equipment in waterway except when operated from a barge. Any small tools and equipment operating in water bodies must be cleaned prior to entering the water and inspected daily for leaks; equipment should never be left in water overnight. Do not skid construction material across waterways.</p> <p>Store oils, lubricants, fuels, and chemicals as specified above in Soils section of this table.</p> <p>Refuel equipment off slopes and away from water bodies and aquatic habitat (a minimum of 30 m away from the Lake).</p> <p>Refuel machinery and follow spill avoidance procedures as specified above in Soils section of this table.</p> <p>Do not pump water that flows/seeps through coffer dam into construction work area directly into waterways. Send all discharge to sediment traps in order to satisfy discharge requirements. Install, sediment trap as required to treat surface water runoff in the construction area and prevent sediment from entering waterways. Water quality downstream of construction site and/or released to watercourses not to exceed background turbidity readings of 8 nephelometric turbidity units (NTU) or change of 25 mg/L for suspended solids. Dispose of water so that it does not create a safety or health hazard, or cause damage to the environment, to adjacent property or cause erosion.</p> <p>Do not use or and discharge chemicals or cleaning agents near aquatic habitats. Do not dump excavated fill, waste material or debris into waterways.</p> <p>Check that all painting and staining are done upland well above the upper controlled water elevation level.</p>				
		<p>Attach drop cloths to scaffolding to prevent deleterious materials such as, paints, timbers, concrete, and solvents from entering the water. Ensure all equipment and temporary access structures such as scaffolding placed in watercourses are free of earth material, fuel, lubricants coolant and other deleterious material that could enter the watercourses.</p>				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		Check that absorbent materials are available onsite in case a spill of deleterious substances should occur. All spills and leaks of deleterious substances must be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre at 1-800-268-6060 and the project team members as appropriate.				
		As concrete leachate is alkaline and highly toxic to fish and other aquatic life, ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials (concrete) will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside formed structures. Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment. All concrete wash water will be disposed of offsite in a location where it will not enter subsurface drains, water bodies or storm drains. Prevent any water that contacts uncured or partly cured concrete during activities like exposed aggregate wash-off, wet curing, or equipment washing from directly or indirectly entering any watercourse or storm water system. Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C. Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH. Use only non-toxic biodegradable form stripping agents.				
		Operate and store all materials and equipment used for the Project in a manner that prevents any deleterious substance from entering the water. Prevent spillage of stored chemicals, gasoline, fuel or other petroleum products into the waterway.				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
		Check that any construction vehicle entering onto privately owned lands or land outside of the DIA Study Area is thoroughly cleaned prior to arrival, for the purpose of removing any soil, organisms, or propagules from other worksites.				
		Remove accumulated sediments prior to removing erosion control devices.				
Groundwater	Change in groundwater flow patterns, recharge and levels in aquifers and yields of wells due to dewatering or interception of aquifers, changes to infiltration, changed flow patterns or damage to wells.	Avoid intercepting aquifers; avoid unnecessary disruption of active tile drains.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant when mitigation measures applied	No	Limited potential exists for groundwater to be impacted when mitigation measures are applied.
		Maintain surface drainage, ponding, existing soil and ground cover conditions, etc. in groundwater recharge areas.				
Groundwater	Potential contamination of groundwater through spills from machinery, vehicles and/or chemicals stored within the DIA Study Area during the construction activities.	Implement best practices for stored chemical removal to minimize disturbance for the potential for spill releases as discussed in Soils section of this table.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	There is the potential for accidental spills to occur during the Project however spills and impacts to groundwater are expected to be avoided through the application of best management practices and mitigation measures. Should a spill occur the application of appropriate clean up related mitigation measures will minimize impacts to the environment.
		Absorbent materials must be available in DIA Study Area in case a spill of deleterious substances should occur. Implement the procedures discussed above the Soil section of this table.				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
Terrestrial Habitat and Species	Clearing of existing vegetation in DIA Study area during construction activities	Minimize damage and removal of vegetation to the extent possible by establishing staging areas and site access routes away from existing trees/naturalized vegetation to the extent possible. If possible, remove only branches from trees that are obstructing construction works and avoid whole tree removal if practical.	Magnitude: <i>Small</i> Reversibility: <i>Some irreversible impacts</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	The mitigative measures will address potential impacts to terrestrial habitat and species as long as the site is revegetated shortly after disturbance and the rehabilitation replaces as a minimum the vegetation impacted by this work.
		Schedule work so that tree trunks are removed prior to hibernation period. If unavoidable prior to cutting trees, rap their trunks repeatedly with a stick (or similar object) to awaken hibernating mammals for work being completed in the winter.				
		Stabilize and re-vegetate all exposed soils as soon as possible.				
		Undertake vegetation clearing outside of the breeding bird season. Avoid clearing from April 5 to August 31 (EC, 2014b).	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied		

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
	Construction encroachment/runoff on adjacent more sensitive vegetation areas	<p>Identify vegetation selected for removal or protection and install and specific protection barriers where required prior to construction.</p> <p>Implement temporary erosion and sediment control measures to prevent erosion/runoff from impacting adjacent vegetated lands and riparian areas. Maintain these measures until the construction and staging areas have stabilized.</p>	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Reversible</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration: <i>Short-term</i></p> <p>Frequency: <i>Continuous</i></p>	Insignificant when mitigation measures applied	No	Runoff from construction areas could impact sensitive vegetation however this effect are expected to be minimized through the implementation of mitigation measures.
	Potential damage to private property in DIA Study Area by trucks and heavy machinery	Restore the site to its original or an improved condition where possible. Damage to the site from heavy machinery should be minimized. Any damaged areas must be repaired, graded leveled and re-seeded by the contractor upon completion of the Project.	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Reversible</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration: <i>Short-term</i></p> <p>Frequency: <i>Continuous</i></p>	Insignificant when mitigation measures applied	No	Impacts to private property will occur as a result of Project activities however effects are expected to be addressed through the application mitigation measures.
	Disruption of wildlife and vegetation from changes in surface water and groundwater quantity and quality	Minimize site changes regarding water supplies for wildlife and vegetative habitat cover.	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Reversible</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration: <i>Short-term</i></p> <p>Frequency: <i>Continuous</i></p>	Insignificant when mitigation measures applied	No	Disruption to wildlife and vegetation are considered minor and temporary with the implementation of mitigation measures. Reconstruction of the Dam is not anticipated to change water quantity or quality in Kennisis Lake/River in the long term.

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
	Disruption to wildlife migration/movement patterns and breeding season due to noise activity	Conduct any disruptive (noise generating) activities outside of breeding season (April 5 – August 31), to be in compliance with the <i>MBCA</i> (see mitigation measures in Birds (<i>MBCA</i>) section)	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Effects on wildlife migration patterns and breeding are expected to be minimized through the application of mitigations measures.
		Investigate the area for dens and nests prior to commencing work Establish vegetative buffers between construction zones and areas known to have sensitive vegetation and wildlife.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>			
Mammals	Habitat loss due to construction activities	Minimize as much as possible any disturbance to habitat areas in the DIA Study Area. Drawings to indicate allowable work areas.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	The mitigation measures will address potential impacts to habitat as long as the site is revegetated shortly after disturbance and the rehabilitation replaces as a minimum the vegetation impacted by this work.

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
	Temporary noise generated from the Project construction activities has the potential to disturb mammals.	Check that equipment and vehicles are in good working order, are equipped with proper noise emission controls, and that there is no excessive idling/running of vehicles and equipment.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Disturbances to mammals are likely to be minimized through the application of mitigations measures.
Amphibians and Reptiles	Potential temporary habitat loss due to construction activities	During stump removal, monitor the work and stop work as required to allow herpetofauna to escape the work area if observed. Relocate herpetofauna away from the construction area to a similar habitat within the surrounding area.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	The mitigation measures will address potential impacts to habitat as long as the site is revegetated shortly after disturbance and the rehabilitation replaces as a minimum the vegetation impacted by this work.
		Minimize as much as possible any disturbance to vegetation and surrounding area.				
		Restore vegetation as much as possible upon completion of construction				
Human Health & Safety	Concern for exposure of contaminants to workers and, less likely, members of the public during construction and associated activities.	Develop a written Site-Specific Health and Safety Plan, including emergency contacts.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Human health and safety impacts minimized through implementation of a Health and Safety Plan.
		Train all workers regarding the Health and Safety Plan.				

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
	Concern for worker's health and safety	Comply with Canadian Occupational Safety and Health Regulations. Provide and require the proper use of personal protective equipment.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Human health and safety impacts minimized through compliance with regulations.
	Potential Danger to the public	Restrict public access to active work areas to minimize potential accidents. Erect a temporary fence around the construction staging areas and at other areas to prevent access to the work site. Signage in both official languages must be visible to alert the public to the activities. Install barriers at the end of each working day to prevent entry to the temporary access road by pedestrians and vehicles.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Human health and safety impacts to the public minimized through implementation of a Health and Safety Plan.
	Potential for driver error and derailment when trucks back up	Human guides should be provided for all trucks backing up during Project activities	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Potential for driver error minimized through use of human guides.

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
Waste Disposal	Generation, storage and disposal of wastes generated during Project construction activities	Implement construction, renovation, and demolition (CRD) waste measures for solid, non-hazardous material generated during construction, demolition, or upgrades, or all three, according to Chapter 9 of the PWGSC document entitled, <i>The Environmentally Responsible Construction and Renovation Handbook</i> (PWGSC, 2000).	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Low potential for residual impacts with the application of waste management measures.
		The contractor should make an effort to reduce the amount of waste generated through reuse and recycling.				
		Dispose of all waste generated according to the applicable regulations (Ontario Regulation [O. Reg.] 102/94 and O. Reg. 558/00, R.R.O. 1990, 347).				
		Implement a solid waste management program for typical debris handling and disposal.				
		Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada.				
Aesthetics	Temporary impact to the DIA Study Area during construction	Minimize the extent and duration of construction activities and associated disruptions. Complete construction outside of navigation season.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Minor, temporary impact only.

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
Recreation	Disruption to recreational activities in DIA Study Area as a direct result of Project activities	To minimise the impact on peak summer recreation activities, the Project start date should be restricted to August 17 and be completed prior to navigation season starting.. The municipal boat ramp adjacent to the Dam will be open until November. Snowmobile associations will be notified to re-route the trail around the construction site.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Minor impacts as Project activities are taking place after the navigation season.
		Inform the public of ongoing work and possible temporary disruptions.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Minor, temporary impact only.
		Repair all damages to property due to Project activities.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Minor, temporary impact only.

TABLE 2.5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ¹	Evaluation of Effects (when mitigation measures applied) ²	Residual Effects ²	Monitoring Required	Comments
Land Use	Disruption of normal use of site during construction.	Minimize the extent and duration of construction activities and associated disruptions.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Continuous</i>	Insignificant when mitigation measures applied	No	Minor, temporary impact only.

Notes:

NA – Not applicable.

¹ Although some of the pertinent legislation, regulations, guidelines and policies are noted in the mitigation, the information is not necessarily considered complete. Furthermore, it is to be expected that new, amended, modified or otherwise updated legislation, regulations, guidelines and policies will become available over time. PCA and/or their subcontractors are responsible to ensure that all applicable legislation, regulations, guidelines and policies are adhered to.

² Magnitude – Magnitude, in general terms, may vary among Issues, but is a factor that accounts for size, intensity, concentration, importance, volume and social or monetary value. Effect are relative to natural or background conditions (for example, small - relative to natural or background conditions, moderate - relative to natural or background conditions , large - relative to natural or background conditions).

Reversibility – of effect (that is, reversible - effect can be reversed or irreversible-effects are permanent).

Geographic extent – footprint of the effect (that is, immediate-confined to project site; local-effects beyond immediate project site but not regional in scale; regional-effects on a wide scale).

Duration – time effect is evident (that is, short term-between 0 and 6 months in duration; medium term-between 6 months and 2 years; long term-beyond 2 years).

Frequency – conditions causing an effect (that is, once-occurs only once; intermittent-occurs occasionally at irregular intervals; continuous-occurs on a regular basis and at regular intervals).

³ Source: DFO Measures to Avoid Causing Harm to Fish and Fish Habitat <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Inspection and testing, administrative and enforcement requirements.
- .2 Tests and mix designs.

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 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.3 INDEPENDENT
INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work, above and beyond those required of the Contractor. Cost of such services will be borne by Departmental Representative.
 - .2 Provide equipment required for executing inspection and testing by appointed agencies.
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1.3 INDEPENDENT
INSPECTION AGENCIES
(Cont'd)

- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency 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 PROCEDURES

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

1.6 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
-

1.6 REJECTED WORK .3 (Cont'd)
(Cont'd)

or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.7 REPORTS .1 Submit three (3) copies of inspection and test reports to Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS .1 Furnish test results and mix designs as may be requested.

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

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

- 1.1 DESCRIPTION
- .1 Work under this section relates to condition surveys and monitoring of structures and buildings which are adjacent to the construction site and which may be affected by excavation, dewatering and vibration producing activities (such sheet pile driving/vibrating, concrete demolition work, excavation of frozen ground, and operation of heavy construction equipment.)
 - .2 The Contractor is advised that structures, buildings and water supply wells are located close to the proposed work and that construction activities are to be conducted in such a manner to preclude damage to these structures, buildings and wells. The Contractor shall be responsible for any damage caused by their activities.
 - .3 The contractor shall undertake environmental monitoring of the sediment and erosion control system including water quality of discharge from dewatering operations.
 - .4 The scope of work described in this section is a minimum requirement for conducting a condition survey and monitoring of the work. The Contractor Design Engineer together with the Monitoring Engineer are to review and advise the Departmental Representative on movement and vibration criteria and any additional monitoring requirements.
 - .5 The monitoring work under the present scope only covers the construction area and immediate surroundings. The Contractor shall take full responsibility for other areas as part of their construction operation including haul routes.

1.2 RELATED SECTIONS

- .1 Section 01 11 00 - Summary of Work
 - .2 Section 01 33 00 - Submittal Procedures
 - .3 Section 01 35 43 - Environmental Procedures
 - .4 Section 01 77 00 - Closeout Procedures
 - .5 Section 02 41 16 - Structure Demolition
-

1.2 RELATED .6 Section 31 23 33 - Excavating and Backfilling
SECTIONS
(Cont'd) .7 Section 35 20 22 - Dewatering and Diversion

1.3 MEASUREMENT AND .1 There shall be no separate measurement for
PAYMENT PROCEDURES 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.

1.4 INDEPENDENT .1 An Independent Inspection/Monitoring Firm(s)
INSPECTION AGENCIES shall be retained by the Contractor for the
purpose of inspecting and/or monitoring
portions of Work as described in this section.
Cost of such services will be borne by the
Contractor.
.2 The Independent Inspection/Monitoring Firm(s)
team shall be qualified and competent in:
.1 performing condition surveys;
.2 the determination of allowable movement
including displacement and vibration at
structures and embankments;
.3 the protection of adjacent buildings,
shoreline structures and embankments;
.4 the protection of groundwater wells;
.5 the establishment of measurement
procedures and their implementation;
.6 monitoring and reporting.
.3 The Condition Survey shall be undertaken by a
qualified and competent inspector.
.4 If requested by the Departmental
Representative, submit the inspector and
monitoring specialist qualification and
experience.

1.5 DEFINITIONS .1 Monitoring Engineer: refers to the
independent inspection / monitoring firm which
is responsible for the work under this
section.
.2 Design Engineer: refers to the
engineer/engineering firm retained by the
Contractor to design and oversee the
construction of the temporary and permanent

- 1.5 DEFINITIONS (Cont'd)
- .2 Design Engineer:(Cont'd)
works (construction of sheet pile cofferdam, temporary construction access roads and diversion system and any other temporary works) required to complete the work under the Contract.
- 1.6 CONSTRUCTION CONTROL AND MONITORING
- .1 At least fifteen (15)days prior to start of work, the Contractor shall submit their Construction Control and Monitoring (CCM) plan. The plan shall be prepared in conjunction with the work area dewatering and water diversion construction plans, demolition plan and environmental management plan for sediment and erosion control.
- .2 As a minimum the CCM plan is to cover:
- .1 the format of the Condition Survey;
 - .2 the extent of the Condition Survey;
 - .3 the methodology to be used to monitor existing cracks in existing buildings and other structures including embankments;
 - .4 the extent and methodology for soil movement monitoring program at existing structures and embankments, including establishment of critical movement criteria, type of monitoring equipment and frequency of measurement.
 - .5 the vibration monitoring program, including influence vibration zone, safe and critical vibration levels and anticipated vibration levels at the closest structure, including type of monitoring equipment and frequency of measurement.
 - .6 the turbidity control and drainage water as part of the sediment and erosion control plan.
 - .7 the format for report reading of CCM plan.
 - .8 measures to protect existing groundwater wells and their services.
- .3 Prior to commencement of the work meet with Departmental Representative to discuss the CCM plan, report format, report frequencies, emergency report and distribution list
-

1.7 GROUNDWATER
WELL MONITORING

- .1 The Departmental Representative will be undertaking a monitoring program of the drinking wells of the adjacent properties. The program will include sampling and testing of water and water levels prior to commencement of work and during the construction and post-construction phases.
- .2 Result of the initial sampling and sampling during the construction and post-construction phases will be shared with the Contractor.
- .3 If water quality changes during the construction phase of the project, the Contractor will be advised. The Contractor will be required to immediately stop all work and take appropriate measures to reduce or eliminate water quality problems.

1.8 TURBIDITY
CONTROL AND
DRAINAGE WATER

- .1 The Contractor shall undertake quality (turbidity) monitoring of any discharge water to a receiving stream as part of their sediment and erosion control plan as set out in Section 01 35 43 and 35 42 19.

1.9 CONDITION
SURVEY

- .1 Prior to commencement of the work, a Pre-Construction Condition Survey Report of adjacent properties and structures, within 50 meters of the defined construction limit at a minimum, that may be affected by the work under this contract shall be submitted by the Contractor.
 - .2 The Condition Survey shall be undertaken by the Contractors qualified inspector together with the Departmental Representative, private landowners and Township/municipality representatives (as applicable).
 - .3 The survey shall include the location and condition of adjacent properties.
 - .4 As a minimum the building and shoreline structures Condition Survey Reports are to cover the above and sub-grade accessible interior walls, exterior visible walls, ceiling, roof and floors, stone open fire pit, stone retaining walls and stairs. The reports shall detail, by sketches, video tape, photographs, and/or notes, the existing structural and cosmetic condition, but should
-

- 1.9 CONDITION SURVEY
(Cont'd)
- .4 (Cont'd)
not be limited to areas of building exhibiting distress (damage). Any significant cracks are to be identified and monitored.
- .5 Condition Surveys are to be performed for all building and structures located within 40 metres from the edge of excavation and dewatering work, and/or 50 metres from vibration producing activities. As a minimum, the following properties and structures are to be surveyed:
- .1 Adjacent property of Stephen and Shelley Sharples.
- .2 Coordinate survey with the Departmental Representative.
- .6 Furthermore, Condition Survey is to be performed for:
- .1 Township and municipalities roads to be used as Haul Routes.
- .2 Staging areas.
- .3 Shoreline at perimeter of construction areas.
- .7 The Contractor shall perform a monthly inspection of the Haul Routes and Kennisis Lake Road and report their findings to the Township/Municipality and Departmental Representative. Repair and make good any damage to the satisfaction of the Local Authorities and the Departmental Representative.
- .8 Upon completion of the work under the contract a Post-Construction Condition Survey shall be performed on all properties, buildings or structures that were surveyed as part of the Pre-Construction Condition Survey. The survey needs to focus on the same issues that were identified under the original survey, plus any new issues that may have developed during the construction period.
- 1.10 CONDITION SURVEY REPORT
- .1 Prepare and submit a DRAFT Pre-Construction Condition Survey Report for review and approval by the Departmental Representative prior to construction commencement.
- .2 Revise as required by the Departmental Representative and submit Final version of survey report.
-

- 1.10 CONDITION SURVEY REPORT (Cont'd)
- .3 For each property surveyed, provide four (4) copies of the Condition Survey Report (PDF or approved alternative) with annotation of location of interest and comments on the existing conditions.
 - .4 One copy of the approved report is to be provided to the respective individual landowner and/or township/municipality. One copy is to be maintained on site.
- 1.11 MONITORING
- .1 The Contractor will be responsible to carry out monitoring. Monitoring work is to include:
 - .1 monitoring of cracks in buildings and other structures which were identified as part of the Pre-Construction Condition Surveys;
 - .2 vibration (seismographic) monitoring.
 - .2 Cracks in buildings and structures monitoring:
 - .1 Displacement monitoring gauges shall be installed across any significant existing crack to monitor for any additional building/structure distress due to work under this contract.
 - .2 Location and number of gauges will be established by the Contractor and the Departmental Representative.
 - .3 Gauges shall be read prior to commencement of construction activities and shall continue on a weekly basis until the completion of vibration producing construction activities.
 - .4 The Departmental Representative is to be advised of any significant crack displacement detected by the monitoring gauges.
 - .3 Vibration (Seismograph) monitoring:
 - .1 The monitoring engineer shall:
 - .1 establish vibration influence zones and safe vibration levels and develop the Contractors vibration monitoring program for the adjacent structures as required.
 - .2 supervise the Contractor vibration monitoring program.
 - .2 During vibration producing activities, the Contractor shall monitor vibration levels, and shall not exceed the established safe level to preclude damage to the adjacent structures.
-

- 1.11 MONITORING (Cont'd)
- .3 Vibration (Seismograph) monitoring:(Cont'd)
- .3 The vibration monitoring equipment shall be capable of:
- .1 continuously record peak particle velocity.
 - .2 providing permanent record of the entire vibration event.
 - .3 providing an alarm when vibration limit exceed the established safe vibration level.
 - .4 remotely monitored by the Monitoring Engineer.
- .4 Copies of all vibration records and associated construction activities (sheet pile driving/vibrating, concrete demolition work, excavation of frozen ground, and operation of heavy construction equipment) data shall be provided to the Design Engineer and Departmental Representative on a daily basis.
- .5 Reporting:
- .1 The Monitoring Firm shall provide a written record of findings including new data and its interpretation including other figures and graphs. The record shall be continuous and shall be provided within 24 hours of the measurements being taken.
 - .2 The Contractor Design and Monitoring Engineer shall provide recommendations based on the findings to the Departmental Representative.
 - .3 The report shall be clear and concise and be acceptable to the Departmental Representative.
 - .4 Action requirements by the Contractor shall be clearly defined with schedule of implementation.
 - .5 An addendum to the report shall be made by the Monitoring Engineer based on the result of the action taken by the Contractor to address the construction issue.
- .4 Take appropriate measures to reduce vibration to adjacent properties and structures. If vibration measurements exceeds set criteria, immediately stop all construction activity and inform Design engineer and Departmental Representative of the situation. Provide and implement remedial action to rectify the situation. Obtain written permission from Departmental Representative prior to resuming construction activities.
-

- 1.11 MONITORING .5 Immediately repair any damage to any adjacent
(Cont'd) structure to the satisfaction of the
Departmental Representative.
- .6 Turbidity control and drainage water:
.1 The monitoring firm shall provide a
protocol and methodology for monitoring the
total suspended solids (TSS) from any
discharge point to a watercourse as set out in
Section 01 35 43, section 1.6.
.2 The Ministry of Environment has
established criteria wherein the allowable
increase in TSS from background levels is 25
mg/l.
.3 Reporting shall be undertaken as set out
in this Section.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

- 3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Temporary utilities.
- .2 Temporary heating.
- .3 Temporary power and light.
- .4 Temporary communication facilities.
- .5 Temporary fire equipment.
- .6 Temporary pumping for dewatering.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29 - Health and Safety Requirements.
- .3 Section 01 35 43 - Environmental Procedures.
- .4 Section 01 52 00 - Construction Facilities.
- .5 Section 01 56 00 - Temporary Barriers and Enclosures.
- .6 Section 01 77 00 - Closeout Procedures.

1.3 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.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
 - .2 Heating Plan including heater numbers, types, locations, capacities.
 - .3 Fan numbers, types, locations, capacities.
 - .4 Number and location of fire extinguishers.
-

- 1.4 SUBMITTALS .5 Location, type and service for sanitation
(Cont'd) facilities.
- 1.5 INSTALLATION .1 Provide temporary utilities controls in order
AND REMOVAL to execute work expeditiously.
- .2 Remove from site all such work after use.
- 1.6 DEWATERING .1 Provide temporary drainage and pumping
facilities to keep excavations and site free
from standing water in accordance to Section
35 20 22.
- .2 Provide standby equipment (generator and
pumps) to ensure continuous and safe operation
of dewatering works.
- 1.7 WATER SUPPLY .1 The Contractor is responsible to arrange and
pay for supply of water for the construction
purpose and for potable water for personal use
of their crew.
- 1.8 HEATING .1 Use only heating equipment type acceptable to
EQUIPMENT the Departmental Representative.
- .2 Heating fuels:
- .1 Use electrical, gas, diesel oil or other
fuels acceptable to the Departmental
Representative.
- .2 Fuel Storage: to requirements of Fire
Commissioner of Canada. Fuel storage is to be
located away from domestic water wells, water
course, sediment settling pond or any other
water surfaces. Fuel storage location to be
accepted by the Departmental Representative.
- .3 Heating Equipment Refueling and
Containment: equipment that needs to be
located near open water, or within the
excavated area is to be placed in a
containment system which can contain any
spillage or leaking of fuel. Containment
system to be accepted by Departmental
Representative.
- .4 Provide and maintain temporary fire
protection equipment during performance of
work commensurate with fuel source selected.
-

1.8 HEATING
EQUIPMENT
(Cont'd)

- .3 Ensure that heating requirement is met by providing, at optimum efficiency of equipment, capacity of 125% of heat requirement and sufficient number of standby heaters ready for use on site.
- .4 Vent exhaust of heating equipment to outside of housing and well clear of combustible materials and air intakes.

1.9 TEMPORARY
HEATING AND
VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
 - .2 Construction heaters used inside enclosed area must be vented to outside or be non-flame less type. Solid fuel salamanders are not permitted.
 - .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against cold.
 - .3 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .4 Provide adequate ventilation to meet health regulations for safe working environment.
 - .4 Maintain minimum temperature within enclosed area as specified in individual Section for the items of work.
 - .5 Ventilation:
 - .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.
-

1.9 TEMPORARY
HEATING AND
VENTILATION

(Cont'd)

- .6 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.
- .7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.
- .8 Provide heating adequate to meet temperature requirements listed in the following Sections:
 - .1 For concrete work: to Section 03 30 00 - Cast-In-Place Concrete.
 - .2 For other sections where heating is required for cold-weather protection, heating requirements shall be in accordance with manufacturer's recommendations or applicable codes, regulations and standard.

1.10 TEMPORARY
POWER AND LIGHT

- .1 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal and on-going utilization cost.

1.11 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.
 - .2 Burning rubbish and construction waste materials is not permitted on site.
-

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Construction aids.
 - .2 Office and sheds.
 - .3 Parking.
 - .4 Project identification.
- 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 Canadian General Standards Board (CGSB)
 - .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA/CAN-S269.3-M92 (2013), Concrete Formwork.
 - .3 CSA-0121-08, Douglas Fir Plywood.
 - .4 CAN/CSA-S269.2-M87(R2003), Access Scaffolding for Construction Purposes.
 - .5 CSA Z797-09 (R2014), Code of Practice for Access Scaffold.
 - .6 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment.
- 1.4 SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00.
- 1.5 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.
-

- 1.5 INSTALLATION AND REMOVAL (Cont'd)
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
 - .3 Indicate use of supplemental or other staging area.
 - .4 Provide construction facilities in order to execute work expeditiously.
 - .5 Remove from site all such work after use.
- 1.6 SCAFFOLDING
- .1 Scaffolding in accordance with CSA-Z797.
 - .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.
- 1.7 HOISTING
- .1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment.
 - .2 Hoists/cranes shall be operated by qualified operator.
- 1.8 SITE STORAGE/LOADING
- .1 Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products.
 - .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
- 1.9 CONSTRUCTION PARKING
- .1 Parking will be permitted for the Contractor within designated area within the Construction Limits only or within the additional land that the Departmental Representative may make arrangements for. No parking will be allowed on Kennisis Lake Road.
 - .2 Provide and maintain adequate access to project site.
 - .3 Provide snow removal during period of Work.
 - .4 If authorized to use existing roads for access to project site, maintain such roads
-

- 1.9 CONSTRUCTION .4 (Cont'd)
PARKING for duration of Contract and make good damage
(Cont'd) resulting from Contractor's use of roads.
-
- 1.10 SECURITY AND .1 The Contractor shall pay for responsible
MONITORING security personnel to guard site and contents
of site after working hours and during
holidays as they deem necessary.
- .2 Contractor shall pay for monitoring of the
site during periods of no construction
activity and to maintain and service
dewatering and heating equipment.
- .3 Contractor shall pay for the operation of the
diversion works as required to maintain
seasonal operating levels, including periods
of no construction activity.
-
- 1.11 OFFICES .1 Provide office heated to 22°C, lighted 750 lx
and ventilated, of sufficient size to
accommodate site meetings and furnished with
drawing lay down table. Provide lock and key
for it.
- .2 Provide a clearly marked and fully stocked
first-aid case in a readily available
location.
- .3 Subcontractors may provide their own offices
as necessary. Direct location of these
offices.
- .4 Departmental Representative's Site office.
.1 Provide temporary office for
Departmental Representative.
.2 Inside dimensions minimum 3.6 m long x 3
m wide x 2.4 m high, with floor 0.3 m above
grade, complete with 4 50% opening windows and
one lockable door.
.3 Insulate building and provide heating
system to maintain 22° C inside temperature at
-20° C outside temperature.
.4 Finish inside walls and ceiling with
plywood, hardboard or wallboard and paint in
selected colours. Finish floor with 19 mm
thick plywood.
.5 Install electrical lighting system to
provide min 750 lx using surface mounted,
shielded commercial fixtures with 10% upward
light component.
-

- 1.11 OFFICES .4 (Cont'd)
- (Cont'd)
- .6 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.
- .7 Equip office with 1 x 2 m table, 4 chairs, 4 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
- .8 Maintain in clean condition.
- 1.12 EQUIPMENT, .1 Provide and maintain, in a clean and orderly
TOOL AND MATERIALS condition, lockable weatherproof sheds for
STORAGE storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.
- 1.13 SANITARY .1 Provide sanitary facilities for work force in
FACILITIES accordance with governing regulations and ordinances.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 Provide and maintain two public use washroom facilities at location indicated on the drawings. Chemical or flushable portable toilets are acceptable.
- 1.14 CONSTRUCTION .1 Provide and erect, within three weeks prior
SIGNAGE to Contractor mobilization, a project sign in a location designated by Departmental Representative.
- .2 Construction sign 1.2 x 2.4 m, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.
- .3 Indicate on sign, name of Owner, Contractor and Subcontractor with logo, name of project, project identification reference, of a design style acceptable to the Departmental Representative.
-

- 1.14 CONSTRUCTION SIGNAGE
(Cont'd)
- .4 No other signs or advertisements, other than warning signs, are permitted on site.
- .5 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321.
- .6 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.
- .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.
- .6 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .7 Dust control: adequate to ensure safe operation at all times.
- .8 Provide snow removal during period of Work.
- 1.16 CLEAN-UP
- .1 Remove construction debris, waste materials, packaging material as set out in Section 01 74 11.
-

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 Work under this section relates to temporary construction measures to facilitate the work and specifies requirements for designing, supplying, installing, inspecting, maintaining, and removing:
- .1 Cold weather protection, consisting of temporary housing and supplementary heating for the workspaces and the work, as described by the specifications. The requirements of this section apply to all sections of specifications that call for cold weather protection.
 - .2 Work not included in this Section:
 - .1 Provision of separate air supply for workers which is part of Contractor's responsibility under Health and Safety regulations for construction.
- 1.2 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29 - Health and Safety Requirements.
- .3 Section 01 35 43 - Environmental Procedures.
- .4 Section 01 77 00 - Closeout Procedures.
- .5 Section 02 41 16 - Structure Demolition.
- .6 Section 35 20 22 - Dewatering and Diversion.
- 1.3 REFERENCES .1 Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD).
- .2 Ontario Ministry of Transportation, Book 7 of the Ontario Traffic Manual - Temporary Conditions.
- .3 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
 - .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
-

- 1.3 REFERENCES (Cont'd)
- .4 Canadian Standards Association (CSA):
 - .1 CSA-0121-08, Douglas Fir Plywood.
 - .5 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990 as amended, O. Reg. 213/91 as amended.
 - .2 Air Pollution - Local Air Quality (O. Reg. 419/05)
- 1.4 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 of this Section shall be as set out in Section 01 22 01
- 1.5 WORK AREA DELINEATION
- .1 Erect and maintain temporary site enclosures and barriers to delineate the work area as identified on the drawings and other measures as necessary to define the Work area and restrict access of the public to the Work area.
 - .2 Place construction warning signage at the work area and construction camp.
 - .3 Provide lockable truck entrance gate(s). Equip gates with locks and keys.
 - .4 Provide and maintain temporary floating barriers to define the Work area in the waterway and to restrict access to boating public to dewatering and diversion Works, as indicated on the drawings and as set in Section 35 42 15.
- 1.6 TEMPORARY HEATING AND VENTILATION
- .1 Provide temporary heating and ventilation as set out in Section 01 51 00.
- 1.7 GUARD RAILS AND BARRICADES
- .1 Provide secure, rigid guard rails and barricades around deep excavations.
-

- 1.8 TREE PROTECTION .1 Provide barrier around trees and plants designated to remain. Protect from damage by equipment and construction activities.
- 1.9 ACCESS TO SITE .1 Provide and maintain access roads, portage route, ramps and construction runways as may be required for access to the work area and staging areas.
- 1.10 PUBLIC TRAFFIC FLOW .1 Provide and maintain competent signal flag operators, barricades and flares, lights, or lanterns as required to perform Work and protect the 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 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.
-

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

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 mark to the new dam structure on top of the concrete wing wall 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 practise 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.
-

Trent-Severn Waterway EXAMINATION AND
Kennisis Dam Replacement PREPARATION
Project No. R.065660.001

Section 01 71 00
Page 3
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PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Progressive cleaning.
 - .2 Final cleaning.
- 1.2 PROJECT CLEANLINESS
- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner.
 - .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
 - .3 Clear snow and ice from project site and staging areas. Temporary bank/pile snow within work limits and/or remove from site as required.
 - .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 clearly marked separate bins for recycling. Refer to Section 01 74 20.
 - .7 Remove waste material and debris from site and deposit in waste container at end of each working day.
 - .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
 - .9 Clean and maintain haul routes on a weekly basis, or in accordance with the authorities having jurisdictions, whichever is more stringent.
- 1.3 FINAL CLEANING
- .1 When Work is Substantially Performed, remove surplus products, surplus stockpiled material, tools, construction machinery and equipment not required for performance of remaining Work from project site and staging area.
-

- 1.3 FINAL CLEANING .2 Remove waste products and debris, and leave
(Cont'd)
- .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of surplus stockpiled material, waste and debris.
- .5 Remove stains, spots, marks and dirt from railing, signs, safety boom and dam equipment.
- .6 Inspect finishes and equipment and ensure specified workmanship and operation.
- .7 Broom clean and wash exterior walks, steps and dam deck surfaces; rake clean other surfaces of grounds.
- .8 Remove dirt and other disfiguration from surfaces.
- .9 Remove debris and surplus materials from site, including staging areas.
- .10 Remove snow and ice from dam and dam access.

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 CONSTRUCTION AND DEMOLITION WASTE
- .1 Carefully deconstruct and source separate materials and divert from waste destined for landfill to maximum extent possible. Target for this project is 50 % diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.
 - .2 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 separated wastes.
 - .2 Source separate the following waste:
 - .1 Brick and portland cement concrete.
 - .2 Corrugated cardboard.
 - .3 Wood, not including painted or treated wood or laminated wood.
 - .4 Steel.
 - .3 Submit a waste reduction work plan indicating the materials and quantities of material that will be recycled and diverted from landfill.
 - .1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested.
 - .4 Submit proof that all waste is being disposed of at a licensed land fill 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.
- 1.2 WASTE PROCESSING SITES
- .1 Province of: Ontario.
 - .1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
 - .2 Telephone: 800-565-4923 or 416-323-4321.
 - .3 Fax: 416-323-4682.
 - .2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
 - .1 Telephone: 416-657-2797
 - .2 Fax: 416-960-8053
-

1.2 WASTE .2 Recycling Council of Ontario:(Cont'd)
PROCESSING SITES .3 Email: rco@rco.on.ca.
(Cont'd) .4 Internet: http://www.rco.on.ca/.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 CANADIAN .1 Government Chief Responsibility for the
GOVERNMENTAL Environment.

DEPARTMENTS CHIEF
RESPONSIBILITY FOR
THE ENVIRONMENT

Province	Address	General	Fax
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Inquiries

Ontario	Ministry of Environment and Energy 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

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 The requirements for the inspection of the Works by the Departmental Representative for substantial acceptance and final completion.
- 1.2 RELATED SECTIONS
- .1 Section 01 22 01 Measurement for Payment
- .2 Section 01 33 00 Submittal Procedures
- .3 Section 01 32 16 Construction Progress Schedule
- .4 Section 01 35 43 Environmental Procedures
- .5 Section 01 45 00 Quality Control
- .6 Section 01 48 00 Construction Control and Monitoring
- .7 Section 01 74 20 Construction / Demolition Waste Management and Disposal
- .8 Section 35 20 22 Dewatering and Diversion
- .9 Section 35 42 15 Safety Boom Installation
- .10 Section 35 42 19 Preservation of Watercourses
- 1.3 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.
- 1.4 INSPECTION AND DECLARATION
- .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
- .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
-

1.4 INSPECTION AND .1
DECLARATION .2
(Cont'd)

(Cont'd)

.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection:
Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.1 Environmental testing of soils is to be undertaken by the Contractor at the external staging areas to confirm that there has been no impact to the soils. Any issues arising from the testing shall be addressed by the Contractor at their expense.

.2 The Contractor shall provide a release from owners of adjacent lands indicating that there are no impacts to their services and utilities (water, sanitary, storm drainage; electricity, communications) as a result of the Kennisis Lake Dam Replacement construction activities. The Departmental Representative will provide all testing information related to groundwater monitoring to the Contractor for their usage.

.3 The Contractor shall provide a release from the municipality and/or County regarding restoration of the haul road.

.4 The Contractor shall provide a release from any waste transfer / receiving station and/or registered landfill as part of the Waste Management Work Plan.

.5 The Contractor shall provide a release from landowners whose lands have been used as a construction staging area indicating their acceptance of the site clean-up / grading / restoration.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and are fully operational.

.4 Operation of systems have been demonstrated to Owner's personnel.

.5 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental

1.4 INSPECTION AND DECLARATION (Cont'd) .4 Final Inspection:(Cont'd)
Representative, complete outstanding items and request re-inspection.
.1 Upon final acceptance by the Departmental Representative, the Contractor shall formally request that the dam operation be taken over by the Parks Canada Agency on a particular date acceptable to the Departmental Representative.

1.5 CLEANING .1 In accordance with Section 01 74 11 - Cleaning.
.2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 20 - 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

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 As-built drawings and specifications.
 - .2 Equipment.
 - .3 Warranties and bonds.
 - .4 Final site survey.
- 1.2 RELATED SECTIONS
- .1 Section 01 22 01 - Measurement for Payment
 - .2 Section 01 33 00 - Submittal Procedures
 - .3 Section 01 32 16 - Construction Progress Schedule
 - .4 Section 01 35 43 - Environmental Procedures
 - .5 Section 01 45 00 - Quality Control
 - .6 Section 01 48 00 - Construction Control and Monitoring
 - .7 Section 01 74 20 - Construction / Demolition Waste Management and Disposal
 - .8 Section 35 20 22 - Dewatering and Diversion
 - .9 Section 35 42 15 - Safety Boom Installation
 - .10 Section 35 42 19 - Preservation of Watercourses
- 1.3 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.
- 1.4 FORMAT
- .1 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
-

1.4 FORMAT
(Cont'd)

- .2 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .3 Arrange content by under Section numbers and sequence of Table of Contents.
- .4 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .5 Provide 1:1 scaled CAD files in dwg format on CD.

1.5 AS-BUILTS AND
SAMPLES

- .1 Maintain at the site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Amendments.
 - .4 Change Orders and other modifications to the Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
 - .2 Store record documents and samples in field office apart from documents used for construction. 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. Label each document "PROJECT RECORD" in neat, large, printed letters.
 - .4 Maintain record documents in clean, dry and legible condition. 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 of red-lined 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
-

- 1.5 AS-BUILTS AND SAMPLES
(Cont'd)
- .7 (Cont'd)
specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".
- 1.6 RECORDING ACTUAL SITE CONDITIONS
- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
- .1 Measured depths of elements of foundation in relation to established bench mark.
 - .2 Measured horizontal and vertical locations of underground services and utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Field changes of dimension and detail.
 - .4 Changes made by change orders.
 - .5 Details not on original Contract Drawings.
 - .6 References to related shop drawings and modifications.
- .5 Specifications: legibly mark each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Amendments and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, contractor monitoring results as set out in Section 01 48 00 Construction Control and Monitoring, waste management per Section 01 74 20 Construction / Demolition Waste Management and Disposal as required by specifications sections.
-

- 1.7 FINAL SURVEY .1 Submit final site survey certificate in accordance with Section 01 71 00 certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.
- 1.8 WARRANTIES AND BONDS .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 the applicable item of work.
- .4 Except for items put into use with Departmental Representative permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 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 —————

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 This section specifies requirements for demolition of structures and parts of structures, and the removal and salvage of various items as described by the Contract drawings and the specifications.
 - .2 The work includes but is not necessarily limited to:
 - .1 The demolition and disposal including any recycling of materials comprising the existing Kennisis Lake Dam and adjoining cut-off walls on each side in a such way as to allow to complete the Work.
 - .2 The salvage of existing stop log winch assemblies; stop logs; water level measuring system; warning and advisory signage; safety equipment including life buoys; and such other items as may be directed by the Departmental Representative.
- 1.2 RELATED SECTIONS
- .1 Section 01 22 01 - Measurement and Payment.
 - .2 Section 01 33 00 Submittal Procedures.
 - .3 Section 01 35 29 - Health and Safety
 - .4 Section 01 35 43 - Environmental Procedures.
 - .5 Section 01 41 00 - Regulatory Requirements
 - .6 Section 01 56 00 - Temporary Barriers and
 - .7 Section 01 71 00 - Examination and
 - .8 Section 01 74 20 - Construction/Demolition
 - .9 Section 31 23 33 - Excavating and
 - .10 Section 35 20 22 - Dewatering and Diversion
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES
- .1 Measurement Procedure: work under this section will not be measured for payment and shall be form part of the Contract Lump Sum Price.
-

1.3 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd) .2 Payment of this Section shall be as set out in Section 01 22 01 and shall be included in the applicable item of work.

1.4 REFERENCES .1 Canadian Standards Association (CSA International).
.1 CSA S350M - 1980 (R2003), Code of Practice for Safety in Demolition of Structures.
.2 Department of Justice Canada.
.1 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.
.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
.1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.5 DEFINITIONS .1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not be limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.
.2 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related required submittal and reporting requirements.
.3 Waste Audit (WA): detailed inventory of materials in the dam and surrounds. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation projects. Indicate quantities of reuse, recycling and landfill.
.4 Waste Reduction Work Plan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

- 1.6 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 The WMC is responsible for fulfillment of reporting requirements.
 - .3 Prior to beginning of Work on site submit three (3) copies of detailed Waste Reduction Workplan in accordance with Section 01 74 20 - Construction/Demolition Waste Management and Disposal and indicate:
 - .1 Descriptions of and anticipated quantities in tonnes of materials to be salvaged, reused, recycled and landfilled where applicable.
 - .2 Number and location of dumpsters per type of waste material.
 - .3 Anticipated frequency of tipping.
 - .4 Name and address of haulers, and waste receiving and recycling facilities.
 - .5 Receiving facilities of material containing potential hazardous material. These materials are to be disposed in accordance with applicable regulations and not be designated for re-use.
 - .1 Existing deck timber may contain CCA; and
 - .2 Painted steel may contain lead.
 - .4 Submit 4 (four) copies of certified receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on a monthly basis upon request of Departmental Representative.
 - .1 Written authorization from Departmental Representative is required to deviate from receiving organizations 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.
-

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA, and applicable Provincial/Territorial and Municipal regulations.
- .2 Meetings:
 - .1 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work.
 - .2 Hold project meetings biweekly.
 - .3 Ensure the Contractor and appropriate subcontractor WMC representatives attend the meeting along with the Departmental Representative.
 - .4 WMC must provide written report on status of waste diversion activity at each meeting.
 - .5 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in a manner acceptable to the Departmental Representative and in accordance to Section 01 74 20 - Construction/Demolition Waste Management and Disposal.
- .2 Divert excess materials from landfill to site approved by Departmental Representative.

1.9 EXISTING SITE AND STRUCTURE PROTECTION

- .1 Protect existing site features designated to remain and materials designated for salvage. In event of damage, immediately replace such items or make repairs to the satisfaction of the Departmental Representative and at no additional cost to the Owner.
- .2 Provide a pre-construction condition survey and assessment of adjoining structures and infrastructure, utilities and services in accordance with Section 01 48 00.

1.10 ENVIRONMENTAL PROTECTION

- .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure that demolition work does not adversely affect adjacent watercourses,
-

1.10 ENVIRONMENTAL
PROTECTION
(Cont'd)

- .2 (Cont'd)
groundwater and wildlife, or contribute to
excess air and noise pollution.
- .3 Fires and burning of waste or materials are
not permitted on site.
- .4 Do not bury rubbish waste materials.
- .5 Do not dispose of waste or volatile materials
including but not limited to: mineral spirits,
oil, petroleum based lubricants, or toxic
cleaning solutions into watercourses, storm or
sanitary sewers.
.1 Ensure proper disposal procedures are
maintained throughout project.
- .6 Do not pump water containing suspended
materials into watercourses, storm or sanitary
sewers, or onto adjacent properties that are
outside the approved construction limits.
- .7 Control disposal or runoff of water
containing suspended materials or other
harmful substances in accordance with
authorities having jurisdiction and by the
Departmental Representative.
- .8 Protect trees, plants and foliage on site and
adjacent properties where indicated.
- .9 Cover or wet down dry materials and waste to
prevent blowing dust and debris. Control dust
on all temporary roads.
- .10 Do not use dust control agent without
Departmental Representative approval.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- .1 Measures shall be provided to protect site
works to remain and other temporary measures
installed by the Contractor for the
construction.
- .2 Equipment shall be sized adequately for the
work.
- .3 Minimize machinery running time to only while
in use.
-

- 2.1 EQUIPMENT .4 Machinery used for concrete demolition must
(Cont'd) minimize air borne pollution.
- PART 3 - EXECUTION
- 3.1 PROTECTION .1 Protect layout and reference and control
points during demolition work.
- 3.2 PREPARATION .1 Inspect site and verify with the Departmental
Representative items designated for demolition
as identified on the contract drawings, and
items to be salvaged, reused, recycled, and
disposed according to the Waste Reduction
Workplan.
- .2 Take and record all dimensions and elevations
necessary to establish the reconstruction to
the correct alignment, and in its correct
location.
- .3 Make templates in sufficient numbers to
ensure successful re-installation of items
including winch assemblies with respect to
gain opening.
- .4 Do Work in accordance with Section 01 35 43 -
Environmental Procedures.
- .5 Undertake a condition assessment of items to
be salvaged.
- 3.3 SAFETY CODE .1 Do demolition work in accordance with Section
01 35 29 Health and Safety Requirements.
- .2 Blasting operations are not permitted during
demolition.
- 3.4 REMOVAL OF .1 Remove contaminated or dangerous materials as
HAZARDOUS WASTES defined by authorities having jurisdiction,
relating to environmental protection, from
site and dispose in safe manner to minimize
danger at site or during disposal.
- .2 Prior to start of demolition work remove
contaminated or hazardous materials as
approved by Departmental Representative from
site and dispose at designated disposal
facilities in safe manner and in accordance
-

3.4 REMOVAL OF
HAZARDOUS WASTES
(Cont'd)

- .2 (Cont'd)
with applicable requirements and Section
01 74 20.

3.5 DEMOLITION

- .1 Obtain the Departmental Representative's approval to start the demolition part of the work.
- .2 Perform demolition work in accordance with CSA S350M - 1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .3 Remove materials to be salvaged and reused at the new structure and/or delivered to the Parks Canada Agency yard in Haliburton, ON. Store and protect these items. Leave ready for installation at other stages of the work.
Items include:
.1 Stop logs (Parks Canada Agency storage yard);
.2 Mechanical winch assemblies (Parks Canada Agency storage yard);
.3 Stop logs hangers (Parks Canada Agency storage yard);
.4 Safety Equipment (site);
.5 Site notification, warning and advisory signage (Parks Canada storage yard).
- .4 Items identified to be salvaged and stored on site for future re-installation are to be stored in a safe manner as to ensure that they will not be damaged. Replace at Contractors cost, any damaged salvaged items.
- .5 Mechanical winch assemblies will be refurbished by Parks Canada and returned to the site for re-installation by the Contractor.
- .6 Demolish in a manner to minimize dust. Wetting of materials is to be conducted to the extent that there is no surface runoff from the structure being demolished. Provide other temporary measures to prevent the migration of air-borne particulate.
- .7 Remove, recycle and dispose of demolished materials in accordance with the Waste Reduction Workplan including authorities having jurisdiction.
- .8 Stockpile materials in a safe manner for workers and equipment until removed from the
-

- 3.5 DEMOLITION .8 (Cont'd)
(Cont'd)
- .9 At end of each day's work, leave Work in safe and stable condition.
- 3.6 REPORTING .1 Through data gathered from weigh bills or other methodology approved by the Departmental Representative, report the following information weekly to the satisfaction of the Departmental Representative.
- .1 Description of material;
 - .2 Weight, quantity of material;
 - .3 Breakdown of re-use, recycling and landfill quantities;
 - .4 End destination of material.
- 3.7 RESTORATION .1 Upon completion of work, remove debris, trim surfaces and leave work site clean.
- .2 Demonstrate to the Departmental Representative that other site works have not been physically or structurally damaged as a result of demolition works to the requirements of Section 01 48 00.
- .3 Provide a methodology of repair for other site works damaged by the demolition work acceptable to the Departmental Representative. Undertake repairs to the satisfaction of the Departmental Representative.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 35 43 - Environmental Procedures.
 - .2 Section 03 20 00 - Concrete Reinforcement.
 - .3 Section 03 30 00 - Cast-in-Place Concrete.
- 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 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-O86.1-01(R2006), Engineering Design in Wood (Limit States Design).
 - .3 CAN/CSA-O86.1S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood (Limit States Design).
 - .4 CSA O121-08, Douglas Fir Plywood.
 - .5 CSA O151-09, Canadian Softwood Plywood.
 - .6 CSA O153-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 shop drawings for formwork in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, ties, liners, and locations of temporary embedded
-

- 1.4 SHOP DRAWINGS (Cont'd) .2 (Cont'd)
parts. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.
- .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 as approved by the Departmental Representative.
- .5 Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

- 1.5 REQUIREMENTS OF REGULATORY AGENCIES .1 Conform to municipal, provincial and national codes relating to design and construction of formwork.

- 1.6 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.
- .3 Divert wood materials and plastic from landfill to a recycling facility.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Formwork materials:
.1 Use wood and wood product formwork materials to CSA-0121, CAN/CSA-086.1, CSA-0153.
- .2 Form ties:
.1 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 stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of
-

2.1 MATERIALS .3 Form stripping agent:(Cont'd)
(Cont'd) kerosene, with viscosity between 15 to 24
mm²/s at 40°C, flashpoint minimum 150°C, open
cup.

PART 3 - EXECUTION

3.1 FABRICATION .1 Verify lines, levels and centres before
AND ERECTION proceeding with formwork and ensure dimensions
agree with drawings.

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

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

.4 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 or as
specified on other related Sections.

.5 Align form joints and make watertight. Keep
form joints to a minimum.

.6 Use 20 mm chamfer strips on external corners
and/or 20 mm fillets at interior corners,
joints, unless matching original profiles or
specified otherwise.

.7 Radius at coping edges as specified on the
drawings.

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

.9 Built in anchors, sleeves, and other inserts
required to accommodate Work specified in
other sections.

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

3.2 FORM RELEASE .1 Surface preparation:
AGENT .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.

- 3.2 FORM RELEASE .1 (Cont'd)
AGENT .3 Clean form surfaces thoroughly prior to
(Cont'd) 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.
- .2 Application:
.1 Apply concrete form release in
accordance with manufacturer's instructions.
- 3.3 REMOVAL AND .1 Leave formwork in place for seven (7) days
RE-SHORING after placing concrete or until 80% of design
strength is reached.
- .2 Provide all necessary re-shoring 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 subject to requirements of
CSA-A23.1/A23.2.
- 3.4 INSPECTION .1 Contractor shall not close forms prior to
ACCESS reinforcing bar inspection and acceptance by
Departmental Representative.

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 PAYMENT PROCEDURES .1 Measurement Procedure: work under this section will not be measured for payment and shall form part of the Contract Lump Sum Price.
.2 Payment of this Section shall be as set out in Section 01 22 01 and shall be included in the applicable item of work.
- 1.4 REFERENCES .1 American Concrete Institute (ACI)
.1 SP-66-04, ACI Detailing Manual 2004.
.1 ACI 315-99, Details and Detailing of Concrete Reinforcement.
.2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
.2 ACI 350 and ACI 1350.1 for water tightness.
.2 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.
.3 CSA International
.1 CSA-A23.1-09/A23.2-09(R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
.2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
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- 1.4 REFERENCES .3 (Cont'd)
- .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
 - .4 CSA G30.3-M1983(R1998), Cold Drawn Steel Wire 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(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .4 Reinforcing Steel Institute of Canada (RSIC)
- .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.
- 1.5 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 stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Lists.
 - .3 Quantities of reinforcement.
 - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by 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.
 - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.
 - .1 Provide type B tension lap splices unless otherwise indicated.
 - .3 Detail placement of reinforcing where special conditions occur.
-

1.6 QUALITY ASSURANCE .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum two (2) weeks prior to beginning reinforcing work.
.1 Upon request, submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

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 in a manner, which will prevent deterioration and contamination. Deteriorated or contaminated materials will be rejected and shall be removed from site.
.2 Replace defective or damaged materials with new.
.3 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 20 - Construction/Demolition Waste Management and Disposal.
.1 Divert steel materials from landfill to a recycling facility.

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-M, unless indicated otherwise.
.3 Cold-drawn annealed steel wire ties: to CSA G30.3-M or to ASTM A82/A82M.
.4 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.
.5 Bar Supports and Spacers:
.1 Adequate for accurate placing and as required for construction loads.

2.1 MATERIALS
(Cont'd)

- .5 Bar Supports and Spacers:(Cont'd)
- .2 Provide non-conductive bar supports in contact with exposed surfaces that has geometry and bond characteristics that prevents moisture movement from the surface to the reinforcement.
- .3 In walls and slabs exposed to view after form removal: Small concrete blocks made up of same colour and strength as concrete being placed around them.
- .4 Do not use plastic or stainless steel bar supports or side form spacers.
- .5 Design and fabricate special bar supports for top reinforcing bars in slabs where standard bar supports are not high or strong enough.
- .6 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 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.
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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 Ensure cover to reinforcement is maintained during concrete pour.

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for the work Cast-In-Place Concrete.
- .2 Heating, cooling, hot and cold weather protection, curing, formwork and falsework, finishing, and jointing materials are considered as included in the price of the concrete.
- .3 Blended hydraulic cement type Lhb for cast-in-place concrete is specified for use at all mass concrete pours at all reinforced concrete structure.
- 1.2 RELATED SECTIONS .1 Section 01 22 01 - Measurement and Payment.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 02 41 16 - Structure Demolition.
- .5 Section 03 10 00 - Concrete Forming and Accessories.
- .6 Section 03 20 00 - Concrete Reinforcing.
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 Measurement Procedure:
- .1 All concrete work under this section will not be measured for payment and shall form part of the Contract Lump Sum Price.
- .2 Payment of this Section shall be as set out in Section 01 22 01, and shall be included in the applicable item of work for concrete.
- .3 All labour, equipment and materials for cast-in-place concrete including incidentals, complete as specified, shall be included in the applicable price for concrete work.
- .4 Include in the price of concrete the heating or cooling of water and aggregates, and the provision of hot or cold weather protection, including provision for pre-heating of existing substrate.
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- 1.3 MEASUREMENT AND PAYMENT PROCEDURES (Cont'd)
- .5 Include in the price of concrete the bonding agent.
 - .6 Include in the price of concrete curing.
 - .7 Include in the price of concrete the installation of all items embedded therein.
 - .8 Include in the price of concrete supply and installation of waterstops.
 - .9 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.
 - .10 Include in the price of concrete work described in Section 03 10 00 - Concrete Forming Accessories and section 03 20 00 - Concrete Reinforcement.
 - .11 Include in the price of concrete any foundation preparation of the receiving surface including mud slab at existing soils.

- 1.4 REFERENCES
- .1 Abbreviations and Acronyms:
 - .1 Portland Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).
 - .1 Type GU or GUb - General use hydraulic cement.
 - .2 Type MS or MSb - Moderate sulphate-resistant hydraulic cement.
 - .3 Type MH or MHb - Moderate heat of hydration hydraulic cement.
 - .4 Type HE or HEb - High early-strength hydraulic cement.
 - .5 Type LH or LHb - Low heat of hydration hydraulic cement.
 - .6 Type HS or HSb - High sulphate-resistant hydraulic cement.
 - .2 Fly ash:
 - .1 Type F - with CaO content less than 8%.
 - .2 Type CI - with CaO content ranging from 8% to 20%.
 - .3 Type CH - with CaO greater than 20%.
 - .3 GGBFS - Ground, granulated blast-furnace slag.
 - .2 Reference Standards:
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- 1.4 REFERENCES (Cont'd)
- .2 Reference Standards:(Cont'd)
- .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-11, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM C1017/C1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- .5 ASTM C1059, Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- .6 ASTM D412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .7 ASTM D624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .2 CSA International
- .1 CAN/CSA-A5, Portland Cement.
- .2 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .3 CAN/CSA-A23.5, Supplementary Cementing Materials.
- .4 CAN/CSA-A362, Blended Hydraulic Cements.
- .5 CAN/CSA-A363, Cementitious Hydraulic Slag.
- .6 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .7 CAN/CSA-A3001-08, Cementitious Materials for Use in Concrete.
- .8 CAN/CSA G40.21, Structural Quality Steels.
- .9 CAN/CSA G30.18, Billet Steel Bars for Concrete Reinforcement.
- .10 CSA A283-06(R2011), Qualification Code for Concrete Testing Laboratories.
- 1.5 ADMINISTRATIVE REQUIREMENTS
- .1 Pre-installation Meetings: in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (Gantt) Chart, convene pre-installation meeting one (1) week prior to beginning concrete works.
-

- 1.5 ADMINISTRATIVE REQUIREMENTS (Cont'd)
- .1 (Cont'd)
 - .1 Ensure Departmental Representative, speciality contractor - finishing, forming and other key personnel attend.
 - .1 Verify project requirements.
- 1.6 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 At least two (2) weeks prior to commencing the work, provide the Departmental Representative a concrete design that meets the specifications.
 - .3 At least two (2) weeks prior to commencing concrete work submit to the Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that the following materials will meet specified requirements and are compatible:
 - .1 Portland cement.
 - .2 Supplementary cementing materials.
 - .3 Shrinkage compensating grout for concrete
 - .4 Admixtures.
 - .5 Aggregates
 - .6 Water.
 - .4 At least two (2) weeks prior to beginning Work, provide Departmental Representative a cold weather protection plan for concrete.
 - .5 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken.
 - .6 Concrete hauling time : maximum allowable time limit for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
 - .1 Modifications/deviations to maximum time limit must be submitted to Departmental Representative for review.
 - .2 Any changes to maximum time limit must be agreed by Departmental Representative and concrete producer as described in CSA A23.1/A23.2 before permission is granted.
 - .7 Provide two copies of WHMIS MSDS in accordance with Sections 01 35 29 - Health and
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- 1.6 ACTION AND INFORMATIONAL SUBMITTALS
(Cont'd)
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- 1.7 QUALITY ASSURANCE
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- .7 (Cont'd)
Safety and 01 35 43 - Environmental Procedures.
- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 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.
- .3 Minimum two (2) weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
- .1 Temperature control.
- .2 Cold weather protection.
- .3 Curing.
- .4 Finishes.
- .5 Formwork removal.
- .6 Joints.
- .7 Maintaining an environment for concrete curing.
- .8 Preparing works to receive concrete including achieving an acceptable environment and substrate temperature.
- .4 Ensure that mix design is adjusted suitably to prevent alkali aggregate reactivity problems.
- .5 Manufacturer's qualifications:
- .1 Ready mix concrete supplier: Member in good standing of Ready Mix Concrete Association of Ontario (RMCAO). Batching plant facilities are required to maintain RMCAO Special Seal of Quality.
- .2 Batching and delivery facilities: Facilities capable of producing minimum of 50 m³/h, conforming to requirements of CAN/CSA A23.1/A23.2.
- .6 Inspection and tests:
- .1 Materials: CAN/CSA A23.1/A23.2; Inspected and tested for conformance to
-

1.7 QUALITY
ASSURANCE
(Cont'd)

- .6 Inspection and tests:(Cont'd)
 - .1 Materials:(Cont'd)
requirements of this standard and to contract specifications.
 - .2 Tests will be conducted in accordance with CAN/CSA A23.2.
 - .3 Cooperate with and assist the Departmental Representative during inspections and tests.
 - .4 Inspection or testing by the Departmental Representative will not augment or replace Contractor's quality control nor relieve from contractual responsibility.

- .7 Defective concrete:
 - .1 Strength acceptance criteria from cylinder tests will be in accordance with CAN/CSA A23.1/A23.2 except as follows:
 - .1 Concrete shall be considered defective for concrete placements less than 200 m3 when a cylinder test fails to meet specified strength. In such cases concrete in that section may be checked by Departmental Representative by core specimens drilled and tested in accordance with CAN/CSA A23.2. All concrete core extraction and testing shall be conducted by a third party inspection company with a CSA certified testing laboratory with Category I certification.
 - .2 Strength acceptance criteria from core specimens will be in accordance with CAN/CSA A23.1/A23.2.
 - .3 Consider concrete defective if it is structurally unsound, lacks moisture resistance, honeycombed or improperly finished, as determined by the Departmental Representative.
 - .4 The Departmental Representative has the right to require replacement, strengthening or correction of impacted portions of defective concrete structure to acceptance of the Departmental Representative.
 - .1 Bear all cost of rectifying defective concrete including inspections, design, coring, testing, strengthening, demolishing, and replacement. Bear investigation and evaluation cost even if further evaluation of design allows unit to be classed as acceptable concrete.

1.7 QUALITY
ASSURANCE
(Cont'd)

- .8 Records:
- .1 Before unloading at Site, have concrete producer submit to the Departmental Representative a delivery ticket (with each batch of concrete) on which is printed, stamped or written the following information:
 - .1 Name and location of batching plant.
 - .2 Date and serial number of ticket.
 - .3 Name of Contractor.
 - .4 Specific designation of job (name and location).
 - .5 Approved mix code, specified strength, and specific class or designation of concrete indicated in Concrete Mixes article specified.
 - .6 Amount of concrete in cubic meters.
 - .7 Truck number, cumulative total, and/or load number.
 - .8 Time loaded or time of first mixing of cement and water/aggregate.
 - .9 If water added on site, show amount and have this information initialled by the Departmental Representative.
 - .2 Include the following information, which is to be registered by producer's representative on at least two copies of the delivery ticket, after discharge has been completed:
 - .1 Time that load arrived on Site.
 - .2 Time that discharge of load was started.
 - .3 Time that discharge of load was completed.
 - .4 Type and amount of admixtures, if added on Site.
 - .5 Amount of water, if added on Site.
 - .6 Location of placed concrete and any issues encountered.
 - .7 Volume of concrete returned.
 - .3 Maintain accurate records of cast-in-place concrete elements. Include in records the following information:
 - .1 Date of placing concrete element.
 - .2 Location of concrete element.
 - .3 Specified strength of concrete.
 - .4 Air and form temperature when concrete was placed.
 - .5 Temperature of concrete when placed in the form.
 - .6 Test samples taken and results of test samples.
 - .4 Submit additional information designated by the Departmental Representative and

- 1.7 QUALITY ASSURANCE (Cont'd)
- .8 Records:(Cont'd)
.4 (Cont'd)
required to verify compliance with Specifications upon request.
- 1.8 DELIVERY, STORAGE AND HANDLING
- .1 Delivery and Acceptance Requirements:
.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by Departmental Representative.
.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Construction/Demolition Waste Management and Disposal.
.2 Provide an appropriate area on the job site where concrete trucks can be safely washed.
.3 Do not use lake/river water for washing trucks.
.4 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .3 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.
-

PART 2 - PRODUCTS

- 2.1 DESIGN CRITERIA .1 Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.
- 2.2 PERFORMANCE CRITERIA .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.
- 2.3 MATERIALS .1 Blended hydraulic cement: to CAN/CSA-A3001, Type LHb.
- .2 Supplementary cementing materials: to CAN/CSA-A3001.
- .3 Cementitious hydraulic slag ranging between 20% to 30%: to CAN/CSA-A363.
- .4 Pozzolanic mineral admixtures: to CAN/CSA-A23.5.
- .5 Water: to CSA A23.1/A23.2.
- .6 Aggregates: to CSA A23.1/A23.2.
- .7 Admixtures:
- .1 Air entraining admixture: to ASTM C260/C260M and CAN3-A266.1.
- .2 Chemical admixture: to ASTM C494/C494M and CAN3-A266.2, Type WN. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .3 Superplasticizers: to ASTM C1017.
- .8 Grout (Dry Pack): Premixed compound of non-metallic aggregate, cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.
- .9 Grout (Pourable): Premixed compound of non-metallic aggregate, cement, water and reducing and plasticizing agents, of pouring
-

2.3 MATERIALS
(Cont'd)

- .9 Grout (Pourable):(Cont'd)
consistency capable of developing compressive strength of 50 MPa at 28 days.
 - .10 Curing compound: to CSA A23.1/A23.2 white and to ASTM C309, Type 1-chlorinated rubber.
 - .11 PVC waterstops:
 - .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 Ribbed without center bulb (flat ribbed) type with shop welded corners and intersecting pieces with legs not less than 400 mm long having the following dimensions:
 - .1 230 mm (9") wide by 9.5 mm thick for all vertical joints.
 - .2 150 mm (6") wide by 9.5 mm thick for all horizontal joints.
 - .3 Performance requirements to meet:
 - .1 Tensile strength: to ASTM D638, minimum 13.8 MPa (2000 psi).
 - .2 Ultimate elongation: to ASTM D638, minimum 300%.
 - .3 Tear resistance: to ASTM D624, minimum 43.8 kN/m (225 lb/in).
 - .4 Water absorption: to ASTM D570, 0.005 to 0.02%.
 - .5 Low temperature brittleness: to ASTM D746, passed at -37.2°C/-38.3 (-35°F/-37).
 - .6 Cold bent test at -45°C for 2 hours - no cracking.
 - .7 Stiffness in flexure: to ASTM D747, 4.8 kPa (700 psi).
 - .8 Specific gravity: to ASTM D792 - 1.4.
 - .4 Hydrophilic type waterstops will not be considered as an alternative to ribbed waterstops.
 - .12 Bonding adhesive: to ASTM C1059.
 - .13 Anchor Rods and Cast-in Anchors: to CSA-G40.21, Grade 300W, round bar stock threaded at one or both ends to receive a washer and nut and as shown on the Contract drawings.
 - .1 All components shall be hot-dip galvanized to ASTM A123/A123M-09.
-

- 2.3 MATERIALS
(Cont'd)
- .14 Cold-Drawn Steel Wire for Concrete Reinforcement: to CSA G30.3.
 - .15 Chairs, Bolsters, Bar Supports, Spacers: Adequate for strength and support of reinforcing construction conditions. Use non-corrodible materials for all concrete work which will be exposed to view in the finished work. To CAN/CSA-A23.1.
 - .16 Mechanical Splices: Subject to the approval of the Departmental Representative.
- 2.4 MIXES
- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
 - .2 Provide concrete mix to meet following plastic state requirements:
 - .1 Uniformity: no segregation. Concrete shall be tested for density, air content and slump to methods listed in CSA A23.1/A.23.2 to confirm batch uniformity meets requirements of Table 13 of CSA A23.1/A.23.2.
 - .2 Placeability: provide the lowest slump compatible with the conditions of placement. Slump shall be measured at the point of discharge into the forms;
 - .1 Within vertical formwork such as columns, walls and beams: 75 mm +/- 20 mm.
 - .2 In flat sections such as slabs: 60 mm +/- 10 mm.
 - .3 Workability: free of surface blemishes colour variations and segregation.
 - .4 Finishability: to satisfaction of the Departmental Representative.
 - .5 Set time: to conditions of pour and to acceptance of the Departmental Representative.
 - .3 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: C-1.
 - .2 Compressive strength at 28 days: 35 Mpa minimum.
-

- 2.4 MIXES .1 (Cont'd)
- (Cont'd) .3 (Cont'd)
- .3 Maximum nominal size of coarse aggregate: 20 mm for sections having minimum dimension less than 1 meter and 20 to 40 mm for sections having least dimension more than 1 meter.
- .4 Maximum water to cementing materials ratio: 0.4.
- .5 Test aggregate for alkali reactivity as per CSA-A23.2 and as approved by the Departmental Representative.
- .6 Intended application: water retaining structure (dam).
- .7 Surface texture: all deformities repaired including tie-rods, bug holes, honey combs etc.; sack rubbed to provide a uniform texture and colour.
- .8 Geometrical requirements: provide reveals, rounded nosing at piers, steps and chamfers as indicated on the drawings.
- .4 Admixtures: to approval of Departmental Representative. Use admixtures to correct deficiencies in the mix or improve placement of concrete.
- .1 Departmental Representative may withdraw prior approval of admixture if conditions encountered during course of work indicate unsatisfactory results.
- .2 Do not use calcium chloride or materials containing calcium chloride.
- .5 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .6 Concrete pumpability characteristic shall be sufficient for the selected equipment and shall be co-ordinated between the Contractor and the concrete supplier.
-

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Obtain Departmental Representative's written approval before placing concrete.
 - .1 Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00.
- .3 Install all items to be embedded prior to commencement of work.
- .4 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .5 Pumping of concrete is permitted only after approval of equipment and mix.
- .6 Ensure formwork, 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 for 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 are corrected.
-

- 3.2 FORMWORK (Cont'd) .3 Strip forms to CAN/CSA-A23.1/A23.2.
-
- 3.3 INSTALLATION/APPLICATION .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Place concrete continuously from start to finish:
- .1 At such rates as to permit satisfactory placing and consolidation - plan the work and use such methods and performance rates as not to allow 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 Coordinate with concrete supplier in selection of appropriate pumping equipment for determined concrete mix and placement applications. Refer to Item 2.4 - Mixes.
 - .2 Arrange equipment so that no vibrations result which might damage freshly placed concrete. Use reversible pumps.
 - .3 Operate pump in such way that a continuous stream of concrete without air pockets is produced.
 - .4 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 items:
- .1 Where approved by Departmental Representative, set embedded items as indicated or specified elsewhere.
 - .2 Do not eliminate or displace reinforcement to accommodate embedded items. If embedded items cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
 - .3 Check locations and sizes of embedded parts shown on drawings.
- .5 Anchor rods:
- .1 Set anchor rods to templates under supervision of appropriate trade prior to placing concrete.
-

3.3 INSTALLATION/
APPLICATION
(Cont'd)

- .6 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- .7 Finishing:
 - .1 Finish concrete to CSA A23.1/A23.2.
 - .2 Unformed surface concrete tolerance to conventional classification in accordance with straight edge method, as per Class B in Table 19.
 - .3 Use a wood (steel) float finish for unformed surfaces that are buried. Exposed surfaces shall be float finished and sack rubbed to the satisfaction of the Departmental Representative.
 - .4 Use smooth-form finish for formed surfaces. Apply a sack rub finish to formed concrete surfaces acceptable to the Departmental Representative.
 - .5 Do patching of form-tie holes, cutout areas, and cavities to CAN/CSA-A23.1 Clause 24.2. Use material that matches in colour with concrete surface.
 - .6 Use procedures as noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .7 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
- .8 Waterstops:
 - .1 Install waterstops to provide continuous water seal.
 - .2 Do not distort or pierce waterstop in way as to hamper performance.
 - .3 Do not displace reinforcement when installing waterstops.
 - .4 Use equipment to manufacturer's requirements to field splice waterstops.
 - .5 Tie waterstops rigidly in place.
 - .6 Use only straight heat sealed butt joints in field.
 - .7 Use factory welded corners and intersections unless otherwise approved by Departmental Representative.
 - .8 Waterstops shall be installed at all structure interfaces.

3.4 COLD WEATHER
PROTECTION

- .1 For concrete placed when air temperature is at or below 5 degrees Celsius, or when air temperature is at or is likely to fall below 5 degrees Celsius within 96 hours after concrete placement, in addition to cold weather requirements of CAN/CSA-A23.1:
- .1 Protect concrete by a windproof shelter of canvas or other material. 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.
- .2 Maintain concrete or grout at following curing temperatures:
- .1 For an initial 3 days, at a temperature of not less than 15 degrees Celsius nor more than 27 degrees Celsius at concrete surfaces.
- .2 Cure at not less than 10 degrees Celsius for an extra 4 days.
- .3 Keep concrete surfaces moist continuously while protected.
- .4 Reduce temperature at a rate not exceeding 10 degrees Celsius per day until outside temperature has been reached.
- .3 Temperature of any surface in contact with fresh concrete shall not be less than 5°C.
- .4 Submit Cold Weather Protection Plan and shop drawings for the heating and hoarding in accordance with Section 01 33 00 - Submittal Procedures.

3.5 TEMPERATURE
CONTROL PLAN

- .1 Submit a Temperature Control Plan to the Departmental Representative a minimum seven (7) days prior to commencement of placing any concrete that requires temperature control, for review of compliance with contract requirements.
- .2 The plan shall include methods for monitoring and controlling concrete temperature and the temperature difference before, during and after placement for:
- .1 Any concrete subject to cold weather.
- .2 Large concrete components where the smallest dimension is 1.5 meters.

3.5 TEMPERATURE
CONTROL PLAN
(Cont'd)

- .3 The temperature control plan shall include, as a minimum, the following:
- .1 Concrete elements for which the plan applies.
 - .2 Temperature monitoring system, including the location and depth, number of thermocouples, and frequencies of recordings to be used in each placement.
 - .3 Method of ensuring concrete temperature and temperature difference are maintained for the duration of the protection period.
 - .4 Any alterations to work schedule, production, delivery schedule, and time of placement for temperature control purposes.
 - .5 Any modifications to mix design for temperature control purposes.
 - .6 Any other specific measures to be taken.
- .4 In addition, for concrete subject to cold weather, the temperature control plan shall include the following:
- .1 Type of insulation, R value and number of layers, including test data verifying the R value. The submission for cold weather protective measures shall be accompanied by samples of insulation, if requested by the Departmental Representative.
 - .2 Type and layout of heaters and type and extent of housing.

3.6 TEMPERATURE
RECORDS

- .1 Data logger temperature records and a record of any actions taken to maintain control of temperature and temperature difference shall be forwarded to the Departmental Representative at the end of each working day during the temperature monitoring period. At the end of the temperature monitoring period, the Contractor shall submit to the Departmental Representative a complete temperature record, including graphical plot of temperature versus time.

3.7 CONTROL OF
TEMPERATURE AND
TEMPERATURE
DIFFERENCE

- .1 The Contractor shall ensure that during the curing period the concrete temperature does not fall below 10°C or exceed 70°C. The Contractor shall also ensure that the temperature difference between the centre of the concrete component at a location where the concrete is expected to reach the highest temperature and the surface does not exceed 20°C for:

3.7 CONTROL OF TEMPERATURE AND TEMPERATURE DIFFERENCE
(Cont'd)

- .1 (Cont'd)
 - .1 Any concrete subject to cold weather.
 - .2 Large concrete components where the smallest dimension is 1.5 meters or greater.

3.8 TEMPERATURE MONITORING

- .1 The Contractor shall monitor the concrete and ambient temperature for:
 - .1 Any concrete subject to cold weather.
 - .2 Large concrete components where the smallest dimension is 1.5 meters or greater.
 - .2 The Contractor shall supply and install thermocouple wires and associated instrumentation with a combined accuracy of ± 1°C capable of recording and displaying temperature. The instrumentation shall include data loggers capable of recording at hourly intervals or less and shall allow direct reading of temperature.
 - .3 The thermocouples for concrete temperature measurement shall be installed according to Table 2 of OPSS 904 prior to placing concrete. Thermocouples for monitoring ambient air temperature shall be installed in the shade close to the surface of the concrete at a frequency of 1 thermocouple per stage.
 - .4 Recording of concrete temperatures shall begin at the start of placement. The temperature shall be recorded automatically at intervals no greater than 1 hour until the end of the monitoring period. The monitoring period shall be 7 days.
 - .5 The Contractor shall take necessary action to maintain the temperature within the specified limits.
 - .6 The Departmental Representative shall be provided access to verify temperature readings. The digital temperature indicators shall be left in place until the end of the monitoring period. If the data logger does not have a digital display that allows the Departmental Representative to verify temperature, the Contractor shall provide the necessary instruments to allow the Departmental Representative to verify thermocouple function and readings.
-

3.9 HOT WEATHER
REQUIREMENTS

- .1 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.

3.10 CURING,
GENERAL

- .1 Unformed surfaces: cure with non-staining fabric and water. Carefully place two layers of damp fabric on the surface of the concrete. Overlap each strip by at least 75 mm and secure against displacement by wind. Maintain fabric in place and keep thoroughly wet for 14 days after day of placing.
- .2 Formed surfaces: formwork shall be left in place for 7 days.
- .3 During curing period uncover only such areas as are immediately needed for finish treatment. Recover and continue curing.

3.11 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 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.
- .3 Departmental Representative will pay for costs of quality control testing.
- .4 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.
-

- 3.12 CLEANING .1 Clean in accordance with Section 01 74 11.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
- .1 Provide appropriate area on job site where concrete trucks and be safely washed.
- .2 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.
- .3 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .4 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.
- 3.13 VERIFICATION .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - Products, by Departmental Representative and provide verification of compliance as described in PART 1 - Quality Assurance.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Material specification, finishes and erection of structural steel members described on the Contract drawings.
- 1.2 RELATED SECTIONS .1 Section 05 52 16 - Guardrails.
.2 Section 05 50 00 - Metal Fabrication.
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 No separate measurement for payment shall be made for structural steel work. Include cost in 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.
- 1.4 REFERENCES .1 American Society for Testing and Materials International, (ASTM)
.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
.3 ASTM A325M-09, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric).
.4 ASTM A325-10, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-85.10-99, Protective Coatings for Metals.
.3 Canadian Standards Association (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 S16-09, Design of Steel Structures..
.3 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
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- 1.4 REFERENCES (Cont'd) .3 (Cont'd)
- .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 CSA W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .6 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
- 1.5 DESIGN REQUIREMENTS .1 Design details and connections in accordance with requirements of CSA S16 to resist forces, moments, shears and allow for movements indicated.
- .2 Shear Connections:
- .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam or the design shears are not indicated. Design for factored loads acting on members where indicated.
- .3 Submit drawings, details, and design calculations stamped and signed by qualified professional engineer licensed in the Province of Ontario, Canada, for all structural steel connections.
- 1.6 SHOP DRAWINGS .1 Submit shop drawings including fabrication and erection documents and materials list in accordance with Section 01 33 00.
- .2 Erection drawings: indicate details and information necessary for assembly and erection purposes including:
- .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.
- .3 Ensure Fabricator drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the Province of Ontario, Canada.
-

- 1.6 SHOP DRAWINGS (Cont'd)
- .4 Indicate all welds on shop drawing by CSA W59 welding symbols.
 - .5 Proposed welding procedures shall be stamped and approved by Canadian Welding Bureau.
- 1.7 QUALITY ASSURANCE
- .1 Submit two (2) copies of mill test reports 4 weeks prior to fabrication of structural steel.
 - .1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.
 - .2 Provide mill test reports certified by metallurgists qualified to practice in Province of Ontario, Canada.
 - .2 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and product standards as specified and indicated.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Structural Steel: to CAN/CSA G40.20/G40.21 Grade 350W for all steel shapes including W sections, channel sections, and angles. Grade 300W for plates, minimum 30% recycled content.
 - .2 Anchor Rods: to CSA G40.21 Grade 300W or ASTM F1554 Grade 36, minimum 30% recycled content.
 - .3 Bolts, nuts and washers: to ASTM A325M, Type 1, minimum 30% recycled content, unless specified otherwise.
 - .4 Welding Materials: to CSA W59, type required for materials being welded and certified by Canadian Welding Bureau.
 - .5 Hot-Dip Galvanizing: galvanize all steel to ASTM A123/A123M, minimum zinc coating of 600 g/m², Coating Grade 85.
 - .1 Touch-Up Primer for Galvanized coating. SPCC 20 Type I Inorganic zinc rich.
 - .6 Shear studs: to CSA W59, Appendix H.
-

- 2.2 FABRICATION
- .1 Fabricate structural steel in accordance with CSA S16 and in accordance with reviewed shop drawings.
 - .2 Provide holes in plates and angles as part of the handrail mounting assembly as indicated on contract drawings.

PART 3 - EXECUTION

- 3.1 GENERAL
- .1 Structural steel work: in accordance with CSA S16.
 - .2 Welding: in accordance with CSA W59.
 - .3 Companies to be certified under Division 01 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

- 3.2 MARKING
- .1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping.
 - .2 Match marking: shop mark bearing assemblies and splices for fit and match.

- 3.3 ERECTION
- .1 Erect structural steel, as indicated and in accordance with CSA S16 and in accordance with reviewed erection drawings.
 - .2 Field cutting or altering structural members: to approval of Departmental Representative.
 - .3 Clean with mechanical brush and touch up galvanized finish to bolts, welds and burned or scratched surfaces at completion of erection.
 - .4 Continuously seal members by continuous welds where indicated. Grind smooth.

- 3.4 FIELD QUALITY CONTROL
- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
-

- 3.4 FIELD QUALITY CONTROL
(Cont'd)
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .3 Departmental Representative will pay costs of tests as specified in Section 01 45 00.
- 3.5 FIELD TOUCH-UP
- .1 Touch-up galvanized surfaces, field welds, bolts and burnt or scratched surfaces with zinc rich primer where burned by field welding.
- .1 Pre-treat damaged surfaces to manufacturer's instructions for zinc rich paint.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Specification requirements for the supply, delivery and installation of miscellaneous steel components required, including attachments, welds, studs, stiffeners, anchors, fasteners or other fixtures and hardware as indicated.
 - .2 Work under this section covers the fabrication of dam operational deck steel grating, gain liners, gain covers, sill beam, stop log slides and other miscellaneous steel fabrication items as indicated on the drawings.
- 1.2 MEASUREMENT AND PAYMENT PROCEDURES
- .1 No separate measurement for payment shall be made for metal fabrication. 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 ASTM International
 - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A153/A153M-09a, Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Hardware.
 - .3 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .4 ASTM A325M-09, Standard Specification for Structural Bolts.
 - .5 ASTM A780-09, Standard Practice for Repair of Damaged and uncoated Areas of Hot-Dip Galvanized Coatings.
 - .6 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, And Tubes.
 - .7 ASTM D7803-12, Standard Practice For Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating.
-

- 1.3 REFERENCES (Cont'd)
- .2 American National Standards Institute (ANSI):
 - .1 ANSI/NAAMM MBG531-00, Metal Bar grating Manual.
 - .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 S16-09, Design of Steel Structures.
 - .3 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .4 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
 - .5 CSA W47.1-09-Certification of Companies for Fusion Welding of Steel Structures.
 - .6 CSA W48.1-M91(R1998), Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.
 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
 - .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- 1.4 STRUCTURAL DESIGN
- .1 Design of connections shall be performed by a structural engineer licensed to practice in the Province of Ontario, Canada.
- 1.5 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00.
 - .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
-

1.6 QUALITY
ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements upon request by the Departmental Representative.
- .3 Subcontractor Qualifications: provide metal fabrications specified in this specification section only by a fabricator who has adequate plant, equipment, and skilled tradesmen to fabricate and install metal fabrications expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past 5 years.
- .4 Welder Qualifications: weld structural component: in steel, in accordance with CSA W59, and by a fabricator fully certified by the CWB to conditions of CSA W47.1 and W55.3 as applicable.

1.7 DELIVERY,
STORAGE AND
HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Unless detailed or specified otherwise, standard products will be acceptable if construction details and installation meet intent of Contract Documents.
 - .2 Include all materials, products, accessories, and supplementary parts necessary to complete the assembly and installation of metal fabrications specified in this specification section.
 - .3 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals
-

2.1 MATERIALS

(Cont'd)

- .3 (Cont'd)
of best quality, and free from rust or waves and buckles and that are clean, straight, and with sharply defined profiles.
 - .4 Rolled structural steel sections: to CSA G40.20/G40.21, Grade 350W.
 - .5 Channels, angles and plates: CSA G40.21, Grade 300W.
 - .6 Bolts: to ASTM A325M Type 1, maximum 30% recycled content, unless otherwise specified.
 - .7 Anchor rods: to ASTM A307 (cast in concrete).
 - .8 Welding materials: to CSA W59.
 - .9 Welding electrodes: to CSA W48 Series.
 - .10 Grating (steel or aluminum):
 - .1 General dam deck area: to ANSI/NAAMM MBG 531, Type HD-30-102M, mild carbon steel to ASTM A1011/A1011M, minimum 30% recycled content, welded, serrated bearing bars 38x6.4 mm @ 30 mm o.c., cross bars @ 102 mm o.c., complete with 38x6.4 mm steel flat bar banding to all bearing bars.
 - .2 Service gain covers: to ANSI/NAAMM MBG 531, Type 30-102M, mild carbon steel to ASTM A1011/A1011M, minimum 30% recycled content, welded, serrated bearing bars 25.4x4.8 mm @ 30 mm o.c., twisted cross bars @ 102 mm o.c., complete with 38x6.4 mm steel flat bar banding all around each panel.
 - .3 Main gain covers: to ANSI/NAAMM MBG 531, Type 30-51M, aluminum 6061-T6 to ASTM B221, serrated bearing bars 25.4x4.8 mm @ 30 mm o.c., twisted cross bars @ 51 mm o.c., complete with 32x32x6.4 mm aluminum structural angle frame as shown on drawings.
 - .11 Weld joints unless otherwise indicated and unless details of construction do not permit welding. Make exposed welds continuous and grind smooth.
 - .12 Make allowance for thermal expansion and contraction when fabricating exterior work.
-

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- .4 Fabricate gratings within limits given in Metal Bar Grating Manual.
- .5 Fabricate to reviewed Shop Drawings and in general to details indicated on drawings and specified herein.

2.3 FINISHES

- .1 Galvanizing: all components, except aluminum grating covers, fabricated under this section are to have hot-dip galvanized finish with zinc coating 600 g/m², Coating Grade 85, to ASTM A123/A123M.
 - .1 Touch-Up Primer for Galvanized coating. SPCC 20 Type I Inorganic zinc rich.
- .2 Bolts and anchor bolts are to be hot-dip galvanized to ASTM A153/A153M, unless otherwise specified.
- .3 Hot-Dip galvanize assemblies following their fabrication except where impossible.

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 Field welding is not allowed.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .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 Make field connections with bolts to CSA S16.
- .6 Deliver items over for casting into concrete together with setting templates.
- .7 Touch-up galvanized surfaces with zinc rich primer where scratched.

3.3 STEEL GRATING
FASTENING

- .1 Fasten steel grating to all supporting steel using fixing clips adequate to grating type consisting of a top saddle clip, lower clamp, hex head cap screw, nut and washer, and is designed for use with HD Type 30 series grating.

3.4 PROTECTION

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

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 The work of this Section includes but is not limited to:
.1 Fabrication and installation of steel HSS guardrails complete with base plates, supporting brackets, including bolts, epoxy anchors, nuts and washers, as shown on Contract drawings.
- 1.2 RELATED SECTIONS .1 Section 05 12 23 - Structural Steel.
.2 Section 05 50 00 - Metal Fabrication
- 1.3 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.
- 1.4 REFERENCES .1 ASTM International
.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A153/A153M-09a, Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Hardware.
.3 ASTM A325M-09, Standard Specification for Structural Bolts,
.4 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
.5 ASTM A501-07, Specification for Hot-Formed Welded and Seamless carbon Steel Structural Tubing.
.6 ASTM A780-09, Standard Practice for Repair of Damaged and uncoated Areas of Hot-Dip Galvanized Coatings.
.7 ASTM D7803-12, Standard Practice For Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating.
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- 1.4 REFERENCES (Cont'd)
- .2 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 S16-09, Design of Steel Structures.
 - .3 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA W48-06 (R2011), Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 CSA W55.3-08 (R2013), Certification of companies for resistance welding of steel and aluminum.
 - .6 CSA W59-13, Welded Steel Construction (Metal Arc Welding), Includes update No. 1 (2014).
 - .3 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.181M.99, Ready-Mixed Organic Zinc-Rich Coating.
 - .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- 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 sections pipe, tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS.
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L prior to use.
 - .3 Shop Drawings:
 - .1 Submit shop drawings stamped and signed by Professional Engineer registered or licensed in Province of Ontario, Canada.
 - .1 Shop drawing to show profiles, sizes, core thickness, connection details, attachments, size, type and number of fasteners, method of anchoring and accessories.
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1.6 QUALITY ASSURANCE .1 Perform welding to CSA W59.

1.7 DELIVERY, STORAGE AND HANDLING .1 Storage and Handling Requirements:
.1 Store materials off ground and in accordance with manufacturer's recommendations.
.2 Store and protect railings from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 STEEL RAILING .1 Rails and Posts: square HSS steel tubing to CAN/CSA G40.20-13/G40.21-13, Grade 350W, as detailed on contract drawings.
.2 Mounting: brackets and steel plates for mounting to steel members and concrete.
.3 Anchor bolts (to concrete): Bolts are to be hot-dip galvanized to ASTM A153/A153M, unless otherwise specified, complete with epoxy adhesive. Polyester resin will not be accepted.
.4 Bolts (to steel): to ASTM A325M Type 1, maximum 30% recycled content, unless otherwise specified.
.5 Splice Connectors: steel welding collars.

2.2 FINISHES .1 Galvanizing: all component fabricated under this section are to have hot-dip galvanized finish with zinc coating 600 g/m², Coating Grade 85, to ASTM A123/A123M.
.1 Touch-Up Primer for Galvanized coating. SPCC 20 Type I Inorganic zinc rich.
.2 Powder Coating:
.1 Guardrail around dam working deck shall be finished with yellow gloss enamel by powder coating application after galvanizing.
.2 Prior to powder coating, all surfaces to be chemically cleaned and treated and prepared in accordance to ASTM D7803 and ASTM F1664. Initial powder coating must be a polyester

- 2.2 FINISHES
(Cont'd)
- .2 Powder Coating:(Cont'd)
 - .2 (Cont'd)
2000 series applied to a dry film thickness of 0.05mm minimum by electrostatic coat and oven cured to a smooth and even surface.
 - .3 Bolts and anchor bolts are to be hot-dip galvanized to ASTM A153/A153M, unless otherwise specified.
 - .4 Hot-Dip galvanize assemblies following their fabrication except where impossible.
- 2.3 FABRICATION
- .1 Fabricate guardrails in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.
 - .2 Fit and shop assemble components in largest practical sizes for delivery to site.
 - .3 Verify dimensions and handrail layout on site prior to fabrication.
 - .4 Fabricate work square, true, straight and accurate to required size. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
 - .5 Form all changes in rail direction by mitering or uniform radius bending within tolerance of HSS tubing size. Fit joints in true planes and securely fasten weld to CSA W59-03. File or grind welds smooth and flush with adjoining surfaces.
 - .6 Provide anchor bolts, plates and angle brackets required for connecting railings to structure.
 - .7 Ensure exposed welds are continuous for full length of each joint.
 - .8 Exposed Mechanical Fastenings: flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
 - .1 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
-

- 2.3 FABRICATION .8 Exposed Mechanical Fastenings:(Cont'd)
(Cont'd)
- .2 Continuously seal joined pieces by intermittent welds and plastic filler continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - .3 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
 - .4 Accurately assemble components to each other and to dam structure.
 - .5 Accommodate for expansion and contraction of members and structure movement without damage to connections or members.

PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for handrail 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 PREPARATION .1 Supply items required to be cast into concrete with setting templates, to appropriate locations.

- 3.3 INSTALLATION .1 Install guardrails in accordance with contract drawings and manufacturer's instructions.
- .2 Install components plumb and level.
 - .1 On inclined surfaces, posts are to be vertical
 - .3 Anchor railing to structure with anchors bolts at concrete and structural bolts at
-

- 3.3 INSTALLATION .3 (Cont'd)
(Cont'd) steel members including all plates and angle brackets
- .4 Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- .5 Drill, clean and install base plates using anchor bolts with epoxy injection adhesive anchoring systems approved by Departmental Representative in accordance to manufacturer's recommendations.
- .6 Align posts so that the maximum deviation of any post from a straight line drawn between end posts is less than 4 mm.
- .7 Use metal shims as required to install handrail posts plumb and true. Metal shims are to be minimum 38 mm wide and the full length of the support plate wherever possible. Shims are to be painted with cold galvanizing repair compound.
- .8 At locations where metal shims are used, fill all voids between concrete and base plates with epoxy adhesive to eliminate any gaps.
- 3.4 TOUCH UP .1 Touch up scratched surfaces of guardrail system or other galvanized components with cold galvanizing repair compound using approved methods recommended by manufacturer.
.1 Acceptable product: Galvafroid or equivalent.
.2 Powder coated surfaces compatible touch up paint shall be used.
- 3.5 ERECTION .1 Maximum Variation From Plumb: 6 mm.
TOLERANCES .2 Maximum Out-of-Position: 6 mm.
- 3.6 CLEANING .1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.
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- 3.6 CLEANING
(Cont'd)
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 20.
 - .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- 3.7 PROTECTION
- .1 Protect installed products and components from damage during construction.
 - .2 Repair damage to adjacent materials caused by handrail installation.

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for safety signage both permanent and temporary at the Kennisis Dam Lake for public safety and navigation.
- .2 The work includes but is not limited to the following:
- .1 Supply and installation of all temporary signs including supporting hardware.
- .2 Supply of all hardware as indicated on Contract drawings and installation of all permanent signs supplied by Parks Canada Agency (PCA will supply signs only)
- 1.2 RELATED SECTIONS .1 Section 01 33 00 Submittal Procedures
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 There shall be no separate measurement for payment for temporary and permanent signs. 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 for signage.
- 1.4 REFERENCES .1 Canadian Dam Association
- .1 Signage for Public Safety Around Dams 2012.
- .2 ASTM International
- .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
- .3 ASTM B210-12, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
- .4 ASTM B221-13, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- .5 ASTM A276-13, Standard Specification for Stainless Steel Bars and Shapes.
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- 1.4 REFERENCES .3 CSA International
(Cont'd) .1 N/CSA-G40.20-04(R2009)/G40.21-04(R2009),
General Requirements for Rolled or Welded
Structural Quality Steel/Structural Quality
Steel.
- 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
safety signage hardware, including product
characteristics, performance criteria,
physical size, finish and limitations.
- 1.6 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 and in
accordance with manufacturer's
recommendations.
.2 Replace defective or damaged materials
with new.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Permanent sign supports:
.1 Post Base: to CAN/CSA G40.20/G40.21,
Grade 300W.
.2 Aluminum Channels (Extruded): to ASTM
B221 (Type T-6063-T6).
.3 Fasteners: u-clamps, bolts, nuts,
washers and other miscellaneous hardware for
signs: 304 or 316 stainless steel as specified
in ASTM A276 and ASTM F1554-A36.
-

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Sign support:
- .1 Erect supports as indicated on Contract drawings. Permissible tolerance: 10 mm maximum departure from vertical.
 - .2 Erect posts plumb and square to details as indicated on shop drawings and to requirements of sign manufacturer.
- .2 Signboard:
- .1 Fasten signboards to supporting posts and brackets as indicated on Contract drawings.
 - .2 Use strapping with bolted connections where signs fastened to handrail assembly.
- 3.2 PROTECTION .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by signage installation.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 This Section specifies requirements for clearing, close cut clearing, grubbing and clearing isolated trees as indicated by the Departmental Representative and on Contract Drawings.
 - .1 Clearing to be limited to allow proper access and ease of work completion on site, this includes clearing of staging areas and construction areas near existing structure of low lying brush and vegetation to provide level and clear terrain for work and equipment access.
 - .2 Tree clearing shall be limited as much as reasonably possible.
 - .2 Identified trees to be removed are to be tagged by the Departmental Representative prior to removal.
 - .3 Contractor to follow environmental mitigating measures as set out in the provided Detailed Environmental Impact Assessment for the Kennisis Lake Dam Replacement (DEIA) report for species at risk interactions. Report to be provided by Departmental Representative with Contract documents. Also refer to Section 01 35 43.
- 1.2 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 01 35 29 - Health and Safety Requirements
 - .3 Section 01 35 43 - Environmental Procedures
 - .4 Section 01 71 00 - Examination and Preparation
 - .5 Section 01 74 11 - Cleaning
 - .6 Section 01 74 20 - Construction/Demolition Waste Management and Disposal
 - .7 Section 31 23 33 - Excavating and Backfilling
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- 1.3 MEASUREMENT AND PAYMENT PROCEDURES
- .1 There will be no separate measurement of Work described in this Section.
 - .2 Payment of this Section shall be included in the applicable Lump Sum Price item as set out in Section 01 22 01.

- 1.4 REFERENCES
- .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 201 Construction Specifications for Cleaning, Close Cut Clearing, Grubbing , and Removal of Surface and Piled Boulders, November 2007.
 - .2 OPSS 805 Temporary Erosion and Sediment Control Measures, November 2010.

- 1.5 DEFINITIONS
- .1 "Clearing" consists of cutting off trees and brush vegetation growth to not more than a 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, deadwood, and trees smaller than 50 mm trunk diameter and disposing of all fallen timber and surface debris.
 - .5 "Grubbing" consists of excavation and disposal of stumps and roots to not less than a specified depth below existing ground surface.
 - .6 "Pruning" consist of the removal of tree limbs and branches by qualified arborist to maintain a healthy tree.
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- 1.6 QUALITY ASSURANCE
- .1 Do construction occupational health and safety in accordance with Section 01 35 29.
 - .2 Safety Requirements: worker protection.
 - .1 Workers must wear gloves, respirators dust masks, long sleeved clothing, eye protection protective clothing.
- 1.7 STORAGE AND PROTECTION
- .1 Prevent damage to trees, landscaping, existing stone retaining wall and earth embankments, water courses and root systems of trees which are to remain.
 - .1 Repair any damaged items to approval of Departmental Representative.
 - .2 Replace any trees designated to remain, if damaged, as directed by Departmental Representative.
- 1.8 WASTE MANAGEMENT AND DISPOSAL
- .1 All slash left from felling and clearing is to be chipped and removed off site by the contractor to a disposal/recycling/composting facility approved by the Departmental Representative.
 - .2 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as sellable timber.
 - .1 Trim limbs and tops, and saw into sellable lengths of 2.4 m for fuel wood.
 - .2 Selling on site is not allowed.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Herbicide: is not permitted on this project.
 - .2 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 reuse.
-

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 watercourse and properties according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

- .1 Inspect site and verify with Departmental Representative trees to be cut and designated to remain.
- .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.
- .3 Notify utility authorities before starting clearing and grubbing.

3.3 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.
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- 3.4 UNDERBRUSH CLEARING .1 Clear underbrush from areas as indicated at ground level.
- 3.5 GRUBBING .1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps as approved by the Departmental Representative.
- .2 Grub out stumps and roots to not less than 200 mm below ground surface.
- .3 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.
- 3.6 REMOVAL AND DISPOSAL .1 Remove cleared and grubbed materials off site to disposal area as approved by Departmental Representative.
- .2 Cut timber greater than 150 mm diameter to 2400 mm lengths and stockpile as indicated. Stockpiled timber becomes property of the Contractor.
- .3 Burning and burial of cleared and grubbed materials are not allowed.
- 3.7 FINISHED SURFACE .1 Leave ground surface in condition suitable for immediate grading operations to approval of Departmental Representative.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 All related work for rough grading including subgrade preparation.
- 1.2 RELATED SECTIONS .1 Section 01 35 43 - Environmental Procedures.
.2 Section 01 35 29 - Health and Safety Requirements.
.3 Section 01 45 00 - Quality Control.
.4 Section 02 41 16 - Structure Demolition
.5 Section 31 11 00 - Clearing and Grubbing.
.6 Section 31 23 33 - Excavating and Backfilling.
.7 Section 31 37 10 - Rip-Rap
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 There shall be no separate measurement for payment for rough grading including preparation of subgrade. Include cost in Contract Lump sum Price.
.2 Payment shall be made as set out in Section 01 22 01 and shall be incidental to all work related to rough grading.
- 1.4 REFERENCES .1 American Society for Testing and Materials (ASTM)
.1 ASTM D698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
.2 Ontario Provincial Standard Specifications (OPSS)
.1 OPSS 206 Grading
.2 OPSS 212 Borrow
.3 OPSS 1010 Aggregates - Base, Sub-base, Select Subgrade and Backfill Materials
.4 OPSS 1860 Geotextiles
.5 OPSS 182 Environmental Protection for Construction in Waterbodies and on Waterbody banks, November 2010
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- 1.4 REFERENCES .2 (Cont'd)
- (Cont'd)
- .6 OPSS 501, November 2010, Construction specification for Compacting
 - .7 OPSS 805 Temporary Erosion and Sediment Control Measures, November 2010
 - .8 OPSS 902, November 2010, Construction Specification, Excavation and Backfilling - Structures
- 1.5 EXISTING .1 Examine subsurface investigation reports
CONDITIONS which are bound into specification.
- .2 Known underground and surface utility lines and services are as indicated on site plan.
 - .3 Refer to dewatering in Section 35 20 22.
- 1.6 PROTECTION .1 Identify all above-ground and below-ground
works including utilities and services prior to commencement of construction.
- .2 Protect existing fencing trees, landscaping, natural features, bench marks, buildings, water control structures; roads, driveways and parking areas, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.
 - .3 Maintain access roads to prevent accumulation of construction related debris on roads. Clean regularly and as directed by Departmental Representative.
-

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Granular fill material in accordance with Section 31 23 33.
 - .2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Departmental Representative.

PART 3 - EXECUTION

- 3.1 GRADING
- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
 - .2 Rough grade to following depths below finish grades:
 - .1 200 mm for grassed areas.
 - .2 to requirements as identified on contract drawings at other work areas.
 - .3 Do not disturb soil within branch spread of trees or shrubs to remain.
- 3.2 SURPLUS MATERIAL
- .1 Remove surplus material and material unsuitable for fill, grading or landscaping off site as directed by Departmental Representative.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 This Section specifies requirements for excavating and backfilling to complete Work as indicated by Contract Drawings and Specifications.
 - .2 Work includes but is not limited to:
 - .1 Excavation required for the demolition of the existing dam and for the construction of the new dam and associated works (permanent and temporary) including identification and protection of underground and aboveground utilities.
 - .2 Stability of temporary and permanent works.
 - .3 Backfilling with approved granular material to patch and repair existing earth embankment slopes to the appropriate grades as indicated on the Contract Drawings. This includes the grading on the downstream face of the earth embankment on both sides of the new concrete structure to match new grade elevation and blend into adjacent embankment slope and grade.
 - .4 Disposal of surplus material.
- 1.2 RELATED SECTION
- .1 Section 01 14 00 - Work Restrictions.
 - .2 Section 01 22 01 - Measurement and Payment.
 - .3 Section 01 35 29 - Health and Safety Requirements
 - .4 Section 01 35 45 - Environmental Procedures.
 - .5 Section 01 74 20 - Construction/Demolition Waste Management and Disposal.
 - .6 Section 02 41 16 - Structure Demolition
 - .7 Section 31 11 00 - Clearing and Grubbing
 - .8 Section 35 20 22 Dewatering and Diversion
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1.3 MEASUREMENT AND
PAYMENT PROCEDURES

- .1 Excavation required for the demolition of the existing dam and for the construction of the new dam and associated works (permanent and temporary) shall not be measured separately and shall be paid as part of the Contract Lump Sum Price for the applicable item of work as set out in Section 01 22 01.
- .2 Temporary access roads, diversion system, steel sheet pile cofferdam and dewatering of excavation will not be measured separately for payment and is to be included in other respective items of works.
- .3 Backfilling will not be measured separately and shall be paid as part of the Contract Lump Sum Price for the applicable item of work as set out in Section 01 22 01.
- .4 Backfilling to authorized limits with rip-rap will be measured for payment in tonne for supply, placement and consolidation as set out in Section 01 22 01 and Section 31 37 10 .
- .5 No separate measurement for payment will be made for over-building and trimming of embankments to bring to final and/or subgrade.
- .6 Payment shall be made as set out in Section 01 22 01 and shall be incidental to or included in the applicable item of work.

1.4 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .2 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
 - .3 Ontario Provincial Standard Specifications / Drawings (OPSS/OPSD), Ontario Ministry of Transportation
 - .1 OPSS 421, April 2008, Construction Specification for Pipe Culvert Installation.
 - .2 OPSS 501, November 2010, Construction Specification for Compacting.
 - .3 OPSS 902, November 2010, Construction Specification for Excavating and Backfilling of Structures.
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- 1.4 REFERENCES .3 (Cont'd)
- (Cont'd)
- .4 OPSS 1004 November 2006, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
- .5 OPSS 1010 April 2004, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
- 1.5 DEFINITIONS .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
- .1 Rock : solid material in excess of 1.00 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with a minimum operating weight of 26,500 kg and a bucket capacity of 1.0 m³ bucket. Frozen material is 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 the Work.
- .3 Topsoil: All uncontaminated soil having a high organic content, without debris that promotes the growth of vegetation that may be used for landscaping, planting and/or seeding.
- .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.
- 1.6 SUBMITTALS .1 Make submittals in accordance with Section 01 33 00.
- .2 Pre-construction 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 and location plan of relocated and abandoned services, as required.
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1.7 QUALITY
ASSURANCE

- .1 Submit design and supporting data at least 6 weeks prior to beginning Work.
 - .2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.
 - .3 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 steel sheet pile cofferdams and diversion structures required for Work as set out in Section 35 20 22 and Section 01 48 00 and acceptable to the Departmental Representative and authorities having jurisdiction.
 - .4 Engage services of qualified Professional Engineer who is registered or licensed in the Province of Ontario, Canada to develop the erosion and sediment control plan and to design and inspect sediment and erosion control measures. Erosion and sediment control measures are to comply with Section 01 48 00 and be acceptable to the Departmental Representative and authorities having jurisdiction.
 - .5 Keep design, temporary works construction plans, details and supporting data on site.
 - .6 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.
 - .7 Health and Safety Requirements:
 - .1 Occupational health and safety during construction in accordance with Section 01 35 29.
 - .8 Regulatory Requirements:
 - .1 Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved. Soil, Ground Water and Sediment Standards for use under Ontario Regulation 153/04, as amended Ontario Regulation 511/09, Part XV.1 of the Environmental Protection Act.
-

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
- .2 Divert excess aggregate materials from landfill to local quarry for reuse as approved by Departmental Representative.

1.9 EXISTING CONDITIONS

- .1 Examine all geotechnical reports.
- .2 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site.
- .3 Existing surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing trees and other plants, shoreline landscaping, lawns, service poles, wires, domestic water wells, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing public washroom building and surface features from damage while Work is in progress to the requirement of the Condition Survey. Undertake monitoring to the requirements of Section 01 48 00. In event of damage, immediately make repair as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Common fill: selected material from excavation or clean fill graded from earth embankment slope adjacent to structure to be replaced, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .2 Granular material: to Ontario Provincial Standard Specification 1010 for:
 - .1 Granular A, maximum size 19.0 mm.
 - .2 Granular B, Type II, maximum size 150mm.
- .3 Sand: clean, washed, minimum 100% passing 4.75 mm sieve, maximum 5% passing 0.075 mm sieve to OPSS 1004.05.04, November 2006.

- .4 Rip-rap: to Section 31 37 10.

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, water course, river and walkways, according to the approved sediment and erosion control.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION/ PROTECTION

- .1 Protect existing features in accordance with Section 01 48 00, Section 01 56 00 and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 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.
- .4 Protect adjacent properties and structures including stone retaining wall and other landscaping features.

3.3 STOCKPILING

- .1 Stockpile fill materials in areas approved by Departmental Representative.
 - .1 Stockpile granular materials in manner to prevent segregation.
 - .2 Stockpile site (excavated) material by type for re-use as backfill.
 - .2 Protect fill materials from contamination.
 - .3 Implement sufficient erosion and sediment control measures to prevent sediment release
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- 3.3 STOCKPILING .3 (Cont'd)
(Cont'd) off construction boundaries and into water bodies.
- 3.4 COFFERDAMS, SHORING AND BRACING .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29 and Health and Safety Act for the Province of Ontario.
- .2 Construct temporary Works for dewatering, diversion and other work to depths, heights and locations as approved by Departmental Representative. Cofferdam and diversion work are to be in accordance with Section 35 20 22.
- .3 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.
- 3.5 DEWATERING AND HEAVE PREVENTION .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative's review 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 to approved collection and in manner not detrimental to public and private property, or portion of Work completed or under construction.
- .6 Provide flocculation tanks, settling basins, or other treatment facilities to remove
-

3.5 DEWATERING AND HEAVE PREVENTION .6 (Cont'd)
(Cont'd)

- 3.6 EXCAVATION .1 Excavate to lines, grades, elevations and dimensions as indicated and approved by Departmental Representative.
- .2 Remove concrete, wood, miscellaneous metal, rubble and other obstructions encountered during excavation in accordance with Section 02 41 16.
- .3 For excavation of embankments, undertake the Work to maintain slope stability. Sub-cut the slope to create steps of a minimum 1.0m high and 1.0m deep, and to meet safety codes.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench as approved by Departmental Representative.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material in approved location off site.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Earth bottoms and slopes of excavations to be undisturbed soil, free from loose, soft or organic matter.
- .9 Notify Departmental Representative when the planned bottom of excavation is reached.
- .10 Obtain Departmental Representative approval of completed excavation.
- .11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as approved by Departmental Representative.
- .12 Undertake excavation in a manner to protect temporary works.
- .13 Correct unauthorized over-excavation as follows:
.1 Fill under foundation bearing surfaces: with concrete specified for foundation.
-

- 3.6 EXCAVATION .13 (Cont'd)
(Cont'd)
- .2 Fill under other areas with Granular "B" compacted to not less than 95% of Standard Proctor Maximum Dry Density.
- 3.7 FILL TYPES AND .1 Use types of fill with compaction as
COMPACTION indicated.
- .2 Compaction shall be undertaken to the following requirements, unless otherwise specified on the Contract drawings and specifications:
- .1 Common (native) materials (unless otherwise specified): Compact 95% Standard Proctor Maximum Dry Density.
- .2 Backfill with common fill acceptable to the Departmental Representative at landscape areas disturbed by the diversion system and other works. Compact 95% Standard Proctor Maximum Dry Density.
- .3 Rip-rap: consolidate with hydraulic excavator bucket in a manner acceptable to the Departmental Representative.
- 3.8 BACKFILLING .1 Do not proceed with backfilling operations until completion of following:
- .1 Departmental Representative has inspected and approved installations.
- .2 Inspection, testing, approval, and recording location of underground utilities.
- .3 Removal of concrete formwork.
- .4 Removal of shoring and bracing.
- .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 subgrade unless specified elsewhere and as approved by the Departmental Representative. Compact each layer before placing succeeding layer.
- .5 Place rip-rap to Section 31 37 10.
-

3.9 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 20, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Reinststate landscapes to elevations which existed before excavation.
- .3 Clean and reinststate areas affected by Work as approved by Departmental Representative.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 This Section specifies stone, for heavy rip-rap for erosion protection including supply, installation, and labour required during the implementation of the Work according to the lines, elevations and dimensions within this Section, on the Contract Drawings and or determined by the Departmental Representative.
- 1.2 RELATED SECTIONS
- .1 Section 01 22 01 - Measurement and Payment.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 35 43 - Environmental Procedures.
- .4 Section 01 74 20 - Construction/Demolition Waste Management and Disposal.
- .5 Section 31 22 13 - Rough Grading.
- .6 Section 31 23 33 - Excavating and Backfilling.
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES
- .1 Measurement Procedures: in accordance with Section 01 22 01 - Measurement and Payment.
- .2 The work will be measured and paid for under payment item included in the Unit Price Table:
.1 Item No.1 - Heavy Rip-Rap: This item covers the work described in subsection 1.1.1.
- .3 Measure rip-rap in tonnes of material placed as set out in Section 01 22 01.
- .4 Infilling of rip-rap will be measured for payment in tonnes for supply and placement in lifts as set out in Section 01 22 01.
- 1.4 REFERENCES
- .1 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS 1004 November 2006, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
-

- 1.4 REFERENCES .1 (Cont'd)
(Cont'd) .2 OPSS 511, April 2011, Construction Specifications for Rip-Rap Rock Protection and Granular Sheeting.
-
- 1.5 WASTE .1 Divert left over aggregate materials from
MANAGEMENT AND landfill to local quarry for reuse as approved
DISPOSAL by Departmental Representative.

PART 2 - PRODUCTS

- 2.1 STONE .1 Hard, with relative density not less than 2.65, durable quarry (shot-rock)stone, free from seams, cracks or other structural defects, clean with no deleterious materials, durable and resistant to weathering by air and water, non-acid generating, acceptable to the Departmental Representative. The Departmental Representative may reject any material at the stockpile, based on visual inspection, which contains excessive fines, dust or other deleterious products. The rip-rap shall meet following size distribution for the use intended:
- .1 Downstream rip-rap:
 - .1 Not more than 10% of total volume of stones with individual size less than 500 mm (D min). Minimum size shall have a mean diameter of 350 mm.
 - .2 Not less than 50% of total volume of stones with individual size of 700 mm (D max).
 - .3 Remaining percentage of total volume to have uniform distribution of stones between 600 mm and 700 mm size.
 - .4 Stones are to have angular faces and be spherical. No one dimension shall be greater then 30% of the mean dimension.
 - .5 Stones shall be free of sand, silt and clay fraction. The Contractor should consider washing of the stone to provide material free of rock fines and dust at the source.
-

PART 3 - EXECUTION

3.1 PLACING

- .1 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .2 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .3 Place rip-rap to thickness and details as indicated.
 - .1 Placement shall be controlled to ensure that a uniform and continuous cover results.
- .4 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.
 - .1 Placement of rip rap so that it forms dense, well-graded mass of stone with minimum voids.
 - .2 Place rip-rap to its full thickness in one operation.
 - .3 Do not place rip-rap by dumping through chutes or other methods that can cause segregation of stone sizes.
 - .4 The finished slope should be free of pockets of small stone or clusters of large stones.
 - .5 Finished grade to blend with the surrounding area.

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 The work of this section includes, but is not limited to the following:
.1 Supply and installation of steel sheet piling around dam foundation and along cut-off walls as shown on Contract drawings.
- 1.2 MEASUREMENT AND PAYMENT PROCEDURES .1 Measurement Procedures: in accordance with Section 01 22 01 - Measurement and Payment.
.2 The work will be measured and paid for under payment item included in the Unit Price Table:
.1 Item No.2 - Steel Sheet Piles: This item covers the work described in subsection 1.1.1.1.
.3 Measure supply and installation of sheet piling in square meters of piling remaining in place after cut-off.
.1 Piling will be measured in plane of bulkhead, calculated by multiplying straight horizontal centre line length of bulkhead measured at top of piles by average vertical length of piles installed and left in work.
.4 Pile toe reinforcement will not be measured separately.
.5 Mobilization and de-mobilization of equipment for installation of steel sheet piling will be a fixed lump sum price.
.6 Supply of all hardware as required for the sheet pile installation, sheet pile design and preparation of construction drawings shall be incidental to the price.
- 1.3 REFERENCES .1 ASTM International
.1 ASTM A6/A6M-11, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
.2 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.
.3 ASTM A615/A615M-09b, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
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- 1.3 REFERENCES (Cont'd)
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- .1 (Cont'd)
 - .4 ASTM A328/A328M-07, Standard Specification for Steel Sheet Piling.
 - .2 CSA International
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .3 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).
- 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 sheet piles and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Shop Drawings showing sheet pile layout; cutoff elevations; assumed rock elevation.
 - .4 Design calculations, prepared by a Professional Engineer licensed in Ontario, for use of sheet piles as a cofferdam/wall structure during construction.
- 1.5 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
 - .4 Use slings for lifting piling making sure mass is evenly distributed and piling is not subjected to excessive bending stresses.
-

1.5 DELIVERY,
STORAGE AND
HANDLING

(Cont'd)

- .5 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.
 - .1 Provide blocking at spacing not exceeding 5 m so that there is no excessive sagging in piling.
 - .2 Overhang at ends not to exceed 1.0 m.
 - .3 Block between lifts directly above blocking in lower lift.
- .6 If material is stock-piled on structure, ensure structure is not overloaded.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sheet piles: to CSA G40.21, grade 350W, and following:
 - .2 Continuous interlocking Z section:
 - .1 Minimum effective section modulus: 1355 cm³ per metre of wall.
 - .2 Minimum flange thickness: 9.5 mm.
 - .3 Minimum web thickness: 9.5 mm.
 - .3 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM A307.
 - .4 Toe of sheet piling shall be supplied with sheet pile protectors.

2.2 SOURCE QUALITY
CONTROL: HOT
ROLLED SHEET STEEL
PILING

- .1 Provide results of tests of sheet piling material to be used on project as follows:
 - .1 If requested, one tension test and 1 bend test from each heat for quantities of finished material less than 50 tonnes.
 - .2 Tension tests in accordance with CSA G40.20/G40.21.
 - .1 If requested, bend tests: to ASTM A6/A6M.
-

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Do welding in accordance with CSA W59
 - .2 Do not begin pile installation until required quality control tests have been completed and test results approved by Departmental Representative.
 - .3 Submit full details of method and sequence of installation of piling to Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.
 - .4 When installing sheet piles, use procedure as follows:
 - .1 Provide temporary templates or bracing to hold piles in alignment during setting and driving.
 - .2 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.
 - .3 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.
 - .4 After one panel has been driven, place and drive succeeding panels in similar manner. Complete driving of end double pile of first panel after double piles of second panel have been driven.
 - .5 When installation is complete, face of wall at top of sheet piles to be within 75 mm of location as indicated and deviation from vertical not to exceed 1 in 100.
- 3.2 OBSTRUCTIONS
- .1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.
 - .2 Advise Departmental Representative immediately if impossible to drive pile to
-

- 3.2 OBSTRUCTIONS (Cont'd) .2 (Cont'd)
full penetration, and obtain direction from Departmental Representative on further steps required to complete Work.
- 3.3 HOLES .1 Patch holes in sheet pile wall, except where permanent holes are indicated.
.1 Use 9.5 mm thick plate of material equal to that of piling to patch holes and overlap not less than hole diameter.
.2 Weld to develop full strength of plate.
- .2 Drill any required holes in piling. Do not use flame cutting without permission of Departmental Representative.
- 3.4 CUTTING .1 When flame cutting tops of piles, and flame cutting holes in piles approved by Departmental Representative, use following procedure:
.1 When air temperature is above 0 degrees C, no pre-heat is necessary.
.2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees C).
.3 Use torch guiding device to ensure smooth round holes or straight edges.
.4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.
- 3.5 SPLICING .1 Use full length piles unless splicing is approved on site by Departmental Representative.
- .2 If splicing is approved, the detail must be submitted for approval, and original stamped by a professional engineer licensed to practice in Ontario.
- 3.6 TOE PINNING .1 Drive sheet piling to bedrock contact.
-

3.7 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.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials and installation for chain link fences and gates.
- 1.2 RELATED SECTIONS .1 Section 03 30 00 - Cast-in-Place Concrete
.2 Section 05 50 00 - Metal Fabrications.
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 There will be no separate measurement of Work described in this Section.
.2 Payment of this Section shall be included in the applicable Lump Sum Price item as set out in Section 01 22 01.
- 1.4 REFERENCES .1 American Society for Testing Materials International, (ASTM).
.1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
.2 ASTM A90/A90M-09, Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
.3 ASTM F1664-08, Standard Specification for Poly Vinyl Chloride (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.
.4 ASTM A27/27M-13, Standard Specification for Steel Castings, Carbon, for General Application.
.5 ASTM A824-01(2012), Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence.
.6 ASTM F626-14, Standard Specification for Fence Fittings.
.7 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.8 ASTM A153/A153M-09, Standard Specification for Zinc Coating (Hot-Dip) Iron and Steel Hardware.
.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
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- 1.4 REFERENCES .2 (Cont'd)
- (Cont'd)
- .2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.
- .3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.
- .4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.
- .5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 Ontario Provincial Standard Specification (OPSS) and Ontario Provincial Standard Drawings (OPSD)
- .1 OPSS 772, November 2010, Construction Specification for Chain-Link Fence.
- .2 OPSS 1541, November 2005, Material Specifications for Chain Link Fence Components.
- .3 OPSD 972.102, November 2005, Fence, Chain-Link Component - Gate.
- .4 OPSD 972.130, November 2005, Fence, Chain-Link Installation - Roadway.
-
- 1.5 SUBMITTALS .1 Submittals in accordance with Section 01 33 00.
- .2 Shop Drawings to indicate:
- .1 Fence profile, sizes, connections, attachments, anchorage size and type of fasteners and accessories.
- .2 Gate sizes, locations, connections, attachments and accessories.
-
- 1.6 HEALTH AND SAFETY .1 Do construction occupational health and safety in accordance with Section 01 35 29.
-
- 1.7 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
- .1 Store materials off ground and in accordance with manufacturer's recommendations.
- .2 Replace defective or damaged materials with new.
-

- 1.8 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan.
 - .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Chain-link fence fabric: to CAN/CGSB-138.1, galvanized steel wire with continuously bonded vinyl coating, finish size (after coating) of 4.26 mm, 50 mm diamond pattern mesh with knuckled, selvage edge on the bottom and twist, selvage edge on the top.
 - .1 Height of fabric: 2.4 m or as indicated on Contract drawings.
 - .2 The vinyl coating colour for wire fabric shall be black.
 - .2 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe, line post are to be 60.3 mm dia., terminal post to be 88.9 mm dia. and top rails are to be 42.2 mm dia. as indicated on OPSD 972.130.
 - .3 Tie wire fasteners: galvanized steel wire with continuously bonded vinyl coating (black).
 - .4 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel.
 - .5 Gate Frame: 48.3 mm O.D. Schedule 40 galvanized steel pipe for fittings and truss rod fabrication to CAN/CGSB-138.4.
 - .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized painted with zinc pigmented paint after welding.
 - .2 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached
-

- 2.1 MATERIALS
(Cont'd)
- .5 Gate Frame:(Cont'd)
 - .2 (Cont'd)
and operated from either side of installed gate.
 - .6 Fittings and hardware: to CAN/CGSB-138.2, galvanized steel malleable ductile cast iron.
 - .1 Tension bar bands: 3 x 20 mm minimum galvanized steel.
 - .2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
 - .3 Turnbuckles to be drop forged.
 - .7 Organic zinc rich coating: to CAN/CGSB-1.181.
 - .8 Anchoring fence posts to concrete: Epoxy adhesive anchor/dowel mortar: Pre-packaged, two part component adhesive consisting of base resin and fast set hardener, mixed by dual chamber cartridge dispenser. Polyester resins will not be accepted. Product to be used in cold temperatures. Acceptable Materials:
 - .1 'Hilti HIT ICE adhesive fastening system' manufactured by HILTI (CANADA) ltd., 1-800-363-4458, www.ca.hilti.com.
 - .2 'Power-fast + System: Installation of Threaded Rod in solid base material' manufactured by Powers Industries Ltd., 514-631-4216 or 905-673-7295, division of Powers Fasteners Inc., www.powers.com. or 'Chem-stud anchor system'.
 - .3 Contractor may provide equivalent alternatives.
 - .4 Use winter grade epoxy when temperatures are below freezing (<0 degrees Celsius). Refer to Manufacturer's recommendations for applications.
 - .9 Adhesive anchors:
 - .1 16mm dia. threaded galvanized anchor rod to ASTM A307 or A36,
- 2.2 FINISHES
- .1 Galvanizing:
 - .1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
 - .2 For pipe: 550 g/m² minimum to ASTM A90.
 - .3 For other fittings: to ASTM A123-09/A123M-09, minimum Coating Grade 85, minimum 600 g/m².
-

PART 3 - EXECUTION

- 3.1 ERECTION OF FENCE
- .1 Erect fence along lines as indicated and as approved by Departmental Representative and to CAN/CGSB-138.3.
 - .2 Install gate and terminal posts as indicated on Contract drawings.
 - .1 Provide base plates with anchorages for mounting to concrete.
 - .2 Provide braces as indicated on Contract drawings.
 - .3 Install caps.
 - .4 Install top and bottom rails between posts and fasten securely to posts with waterproof caps and overhang tops.
 - .5 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.
 - .1 Knuckled selvedge at bottom.
 - .2 Twisted selvedge at top.
 - .6 The fence fabric shall be installed and stretched such that the longitudinal axis of the diamond pattern shall be perpendicular to the slope of the top and bottom rail.
 - .7 Secure fabric to top rails, line posts and bottom rail with tie wires at 450 mm intervals.
 - .1 Give tie wires minimum two twists.
- 3.2 INSTALLATION OF GATES
- .1 Install gates in locations as indicated.
 - .2 Install gate stops.
- 3.3 TOUCH UP
- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas.
 - .1 Pre-treat damaged surfaces according to manufacturer's instructions for zinc-rich paint.
-

- 3.4 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 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies the requirements for reinstating all damaged and landscaped areas within the work and staging areas, access route and areas disturbed by the work and consisting of:
- .1 Restoring South shore residential property disturbed by the Work including restoration of stone wall.
 - .2 Restoring existing access road and municipal grounds to their original state.
 - .3 Supplying and placing of approved native vegetation, including but not limited to:
 - .1 maintenance for plant material during both establishment and warranty periods.
- .2 All disturbed riparian areas (interface zone between land and lake/river), inside the construction limits, as shown on the Contract Drawings, to be re-vegetated with approved local native plants and vegetation as directed by Departmental Representative.
- 1.2 MEASUREMENT AND PAYMENT PROCEDURES .1 There will be no separate measurement of Work described in this Section.
- .2 Payment of this Section shall be included in the applicable Lump Sum Price item as set out in Section 01 22 01.
- 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 all areas affected by Work in conjunction with Departmental Representative before commencement of work.
- 1.5 REFERENCES .1 Agriculture and Agri-Food Canada (AAFC).
- .1 Plant Hardiness Zones in Canada-2000.
-

- 1.5 REFERENCES (Cont'd) .2 Canadian Nursery Landscape Association (CNLA).
.1 Canadian Standards for Nursery Stock, 8th Edition, 2006.
- 1.6 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00.
.2 Product Data: Plant material for re-vegetation
.1 Submit source of:
.1 Fertilizer
.2 Anti Dessicant
.3 Guying and staking assembly including collar, guying rope and anchors
.4 Mulch.
- 1.7 ADMINISTRATIVE REQUIREMENTS .1 Scheduling: obtain approval from Departmental Representative of schedule seven (7) days in advance of shipment of plant material.
.2 Schedule to include:
.1 Date for selection of plant material or representative sample at source by Departmental Representative.
.2 Quantity and type of plant material.
.3 Shipping dates.
.4 Arrival dates on site.
.5 Planting Dates.
- 1.8 SOURCE QUALITY CONTROL .1 Provide name of plant material supplier and obtain approval from Departmental Representative of plant material at source prior to shipping to site.
.2 Arrange for inspection of plant stock upon arrival to site. All rejected plant material shall be removed from the project site immediately upon rejection by the Departmental Representative.
- 1.9 DELIVERY STORAGE AND PROTECTION .1 Schedule deliveries in order to keep storage at the job site to a minimum without causing delays.
-

1.9 DELIVERY
STORAGE AND
PROTECTION
(Cont'd)

- .2 Plant Material:
 - .1 Delivery and Acceptance Requirements:
deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Protect plant material from frost, excessive heat, wind and sun during delivery.
 - .2 Protect plant material from damage during transportation.
 - .2 Storage and Handling Requirements:
 - .1 Immediately store and protect plant material which will not be installed within one day in accordance with supplier's written recommendations and after arrival at site in storage location approved by Departmental Representative.
 - .2 Protect stored plant material from frost, wind and sun and as follows:
 - .1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.
 - .2 For pots and containers, maintain moisture level in containers. Heel-in fibre pots.
 - .3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

1.10 WARRANTY

- .1 For plant material as itemized in subsection 2.3.6 the 12 months warranty period prescribed in General Conditions is extended to 24 months.
 - .2 End-of-warranty inspection will be conducted by Departmental Representative.
 - .3 Departmental Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development, and growth is not sufficient to ensure future survival.
-

PART 2 - PRODUCTS

- 2.1 TOPSOIL .1 New topsoil to be a friable sandy-clayish loam of good humus content, suitable for supporting intended plant and sod growth:
- .1 Soil texture based on The Canadian System of Soil Classification, to consist of 4% organic matter for clay loams and 2% for sandy loams to a maximum of 20%.
 - .2 Contains no toxic elements or growth inhibiting materials.
 - .3 Soil to be 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 SEEDS .1 Mixture composition for low lying areas along waterbody edges where light seasonal flooding is a possibility - MTO Lowland Mix:
- .1 35% Creeping Red Fescue,
 - .2 25% Brome Grass,
 - .3 10% Kentucky Blue Grass Mixture,
 - .4 5% Birdsfoot Trefoil "Leo",
 - .5 5% White Clover,
 - .6 20% Perennial Ryegrass Mixture.
- .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.
- 2.3 PLANT MATERIAL .1 Type of root preparation, sizing, grading and quality: to CNLA Canadian Standards for Nursery Stock.
- .1 Source of plant material: grown in Zone 5 in accordance with Plant Hardiness Zones in Canada.
 - .2 Plant material must be planted in zone indicated as appropriate for its species.
-

- 2.3 PLANT MATERIAL .1 (Cont'd)
(Cont'd) .3 Plant material in location appropriate for its species.
- .2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.
- .3 Trees: with straight trunks, well and characteristically branched for species except where specified otherwise.
- .4 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.
- .5 Collected stock: maximum 40 mm in caliper, minimum 2 meters high, with well developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.
- .6 The Contractor to allow for a total of 15 trees to be planted including ten (10) white spruce trees on the South shore and five (5) mixed trees on the North shore, including two (2) cedars, one (1) maple and one (1) white spruce.
- 2.4 WATER .1 Free of impurities that would inhibit plant growth.
- 2.5 STAKES .1 T-bar, steel, 40 mm by 40 mm by 5 mm by 2440 mm and wood, pointed one end, 38 mm by 38 mm by 2300 mm in location close to utilities/services.
- 2.6 WIRE TIGHTENER .1 Type 1: galvanized steel.
- .2 Type 2: turnbuckle, galvanized steel, 9.5 mm diameter with 270 mm open length.
- 2.7 GUYING WIRE .1 Type 1: steel, 3 mm wire.
- .2 Type 2: 1.5 mm diameter multi-wire steel cable.
-

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- 2.7 GUYING WIRE .3 Type 3: 3 mm diameter multi-wire steel cable.
(Cont'd)
- 2.8 CLAMPS .1 U-bolt: galvanized, 13 mm diameter, c/w
curved retaining bar and hex nuts.
.2 Crimp type.
- 2.9 ANCHORS .1 Wood:
.1 Type 1: 38 mm by 38 mm by 460 mm.
.2 Type 2: 38 mm by 67 mm by 600 mm.
.2 Drive-in type:
.1 Type 1: 13 mm diameter by 75 mm long,
aluminum.
.2 Type 2: 18 mm diameter by 120 mm long,
aluminum.
.3 Screw-in type:
.1 Type 1: 100 mm diameter steel disc.
- 2.10 GUYING COLLAR .1 Tube: plastic, 12 mm diameter, nylon
reinforced.
- 2.11 TRUNK .1 Wire mesh: galvanized, electrically welded
PROTECTION 1.4 mm wire with 25 mm by 25 mm mesh and
fastener.
.2 Plastic: perforated spiralled strip.
.3 Burlap: lean, minimum 2.5 kg/m² mass and
150 mm wide, and twine fastener.
.4 Tar impregnated crepe paper and twine
fastener.
- 2.12 MULCH .1 Shredded Bark: varying in size from 25 mm to
50 mm in diameter, from bark of coniferous
trees.
-

2.13 FERTILIZER .1 Organic commercial type as recommended by soil test report.

2.14 ANTI-DESICCANT .1 Wax-like emulsion.

2.15 SOURCE QUALITY .1 Obtain approval from Departmental Representative of plant material prior to planting.

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 landscaping 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 surface will be faired-off to the existing areas with no sharp transition.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.

.1 Remove debris which protrudes more than 75 mm above surface.

.2 Dispose of removed material off site.

3.2 SUBGRADE COMPACTION .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.

3.3 FINISHING .1 Hand finish slopes that cannot be finished satisfactorily by machine.

3.4 ACCEPTANCE OF TOPSOIL GRADING .1 Departmental Representative will inspect topsoil in place and determine acceptance of depth of topsoil and finish grading.

- 3.5 RE-VEGETATION .1 Re-establish vegetated riparian buffer zones with suitable vegetation to minimum 3 m along edge of watercourse banks as determined by Departmental Representative.
- .2 Plant vegetation natural to area, suitable for application without requirement for fertilizers, pesticides and other chemicals.
- .3 Protect new planting material from disturbance by final construction activities.
- 3.6 PRE-PLANTING PREPARATION .1 Ensure plant material acceptable to Departmental Representative.
- .2 Remove damaged roots and branches from plant material.
- .3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's written instructions.
- 3.7 EXCAVATION AND PREPARATION OF PLANTING BEDS .1 Prepare sub-grade for planting beds in accordance with Section 31 22 13.
- .2 For individual planting holes:
- .1 Stake out location and obtain approval from Departmental Representative prior to excavating.
- .2 Excavate to depth and width as indicated.
- .3 Remove subsoil, rocks, roots, debris, and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
- .4 Scarify sides of planting hole.
- .5 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.
- 3.8 PLANTING .1 For bare root stock, place 50 mm backfill soil in bottom of hole. Plant trees and shrubs with roots placed straight out in hole.
- .2 For jute burlapped root balls, cut away top one third of wrapping and wire basket without
-

- 3.8 PLANTING
(Cont'd)
- .2 (Cont'd)
damaging root ball. Do not pull burlap or rope from under root ball.
 - .3 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.
 - .4 Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to structure, roads and walks.
 - .5 For trees and shrubs:
 - .1 Backfill soil in 150 mm lifts. Tamp each lift to eliminate air pockets. When two-thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.
 - .2 Form watering saucer as indicated.
 - .6 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.
 - .7 Water plant material thoroughly.
 - .8 After soil settlement has occurred, fill with soil to finish grade.
 - .9 Dispose of burlap, wire, and container.
- 3.9 TRUNK PROTECTION
- .1 Install trunk protection on deciduous trees as indicated.
 - .2 Install trunk protection prior to installation of tree supports when used.
- 3.10 TREE SUPPORTS
- .1 Install tree supports as indicated.
 - .2 Use single stake tree support for deciduous trees less than 3 m high and evergreens less than 2 m high.
 - .1 Place stake on prevailing wind side and 150 mm from trunk.
 - .2 Drive stake minimum 150 mm into undisturbed soil beneath roots. Ensure stake is secure, vertical, and unsplit.
 - .3 Install 150 mm long guying collar 1500 mm above grade.
-

3.10 TREE SUPPORTS .2
(Cont'd)

(Cont'd)

.4 Thread Type 1 guying wire through guying collar tube. Twist wire to form collar and secure firmly to stake. Cut off excess wire.

.3

Use 3 guy wires and anchors for deciduous trees greater than 3 m high and evergreens greater than 2 m high.

.1 Use Type 2 guying wire for trees less than 75 mm in diameter and Type 3 guying wire for trees greater than 75 mm in diameter.

.2 Use Type 1 anchors for trees less than 75 mm in diameter and Type 2 anchors for trees greater than 75 mm in diameter.

.3 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed 2.5 m above grade.

.4 Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at an angle of 120°.

.5 Install anchors at equal intervals about tree and away from trunk so that guy wire will form 30° angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.

.6 Attach guy wire to anchors. Tension wire and secure by multi-wraps.

.7 Install wire tightener ensuring that guys are secure and leave room for slight movement of tree.

.8 Saw tops off wooden anchors which extend in excess of 100 mm above grade or as directed by Departmental Representative.

.9 Install flagging tape to guys as indicated.

.10 After tree supports have been installed, remove broken branches

3.11 MULCHING .1

Ensure soil settlement has been corrected prior to mulching.

.2

Spread mulch as indicated.

3.12 MAINTENANCE .1
DURING
ESTABLISHMENT
PERIOD

Perform following maintenance operations from time of planting to acceptance by Departmental Representative.

.1 Water to maintain soil moisture conditions for optimum establishment, growth, and health of plant material without causing erosion.

.1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.2 Remove weeds monthly during establishment period.

.3 Replace or respread damaged, missing or disturbed mulch.

.4 For non-mulched areas, cultivate as required to keep top layer of soil friable.

.5 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial, and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

.6 Remove dead or broken branches from plant material.

.7 Keep trunk protection and guy wires in proper repair and adjustment.

.8 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.13 MAINTENANCE .1
DURING WARRANTY
PERIOD

From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 Reform damaged watering saucers.

.3 Remove weeds monthly.

.4 Replace or re-spread damaged, missing or disturbed mulch.

.5 For non-mulched areas, cultivate monthly to keep top layer of soil friable.

.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial, and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

3.13 MAINTENANCE .1
DURING WARRANTY
PERIOD

(Cont'd)

(Cont'd)

.7 Apply fertilizer in early spring as indicated by soil test.

.8 Remove dead, broken, or hazardous branches from plant material.

.9 Keep trunk protection and tree supports in proper repair and adjustment.

.10 Remove trunk protection, tree supports and level watering saucers at end of warranty period.

.11 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

.12 Submit monthly written reports to Departmental Representative identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

3.14 CLEANING .1

Proceed in accordance with Section 01 74 11.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 This section specifies requirements for Dewatering, Water Diversion Works and Temporary Construction Access Roads described by drawings and specifications.
- .2 These temporary measures shall be designed to accommodate:
 - .1 Seasonal flows and winter conditions;
 - .2 Navigation operating levels;
- .3 Work includes but is not limited to:
 - .1 Engaging a Professional Engineer licensed in the Province of Ontario to design and oversee the implementation of the following:
 - .1 a flow diversion system and related structures;
 - .2 methodology and related structures to control flows and water levels upstream of the Work in response to varying seasonal conditions;
 - .3 the systems used to remove the water at the Work space (site);
 - .4 methodology for maintaining the work spaces in a dry state (task area);
 - .5 methodology for removal of temporary works and for maintaining stability of new and existing Works during the recharging (filling) of the waterway;
 - .6 upstream and downstream temporary construction access road;
 - .2 Implementation of dewatering and diversion works and temporary construction access roads according to the Professional Engineer's design.
 - .3 Constructing and maintaining dewatering and diversion structures and temporary construction roads for the duration of the Work.
 - .4 Providing and maintaining all dewatering equipment for the duration of the Work.
 - .5 Removing water from Work spaces and maintaining these spaces in the dry state for the duration of the Work.
 - .6 Supply of standby equipment to replace dewatering equipment which malfunctions.
 - .7 Removing temporary dewatering and diversion structures and temporary construction access roads at the end of the Work.

1.1 SECTION INCLUDES (Cont'd) .3 Work includes but is not limited to:(Cont'd)
.8 Complying with the provisions of Section 01 35 43 - Environmental Procedures with respect to turbidity and pollution control at all times.

1.2 RELATED SECTIONS .1 Section 01 11 00 - Summary of Work.
.2 Section 01 14 00 - Work Restriction.
.3 Section 01 33 00 - Submittals Procedures.
.4 Section 01 35 29 - Health and Safety Requirements.
.5 Section 01 35 43 - Environmental Procedures.
.6 Section 01 48 00 - Construction Control and Monitoring.
.7 Section 01 74 20 - Construction / Demolition Waste Management and Disposal.
.8 Section 02 41 16 - Structure Demolition
.9 Section 31 23 33 - Excavating and Backfilling.
.10 Section 31 62 16 - Steel Sheet Piles.

1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 There will be no separate measurement of Work described in this Section.
.2 Payment of this Section shall be included in the applicable Lump Sum Price item as set out in Section 01 22 01.

1.4 REGULATORY REQUIREMENTS .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 steel sheet pile cofferdam enclosure: to Section 01 35 43.
.3 Obtain and pay costs of all required permits.

1.4 REGULATORY REQUIREMENTS
(Cont'd)

.4 Sediment and erosion control measures must be in conformance with related contract plans as a minimum, MOE, MNR and DFO permit approval requirements and be acceptable to the Departmental Representative.

.5 Maintain minimum river flow during fish spawning period at Kennisis River Dam as per Section 01 14 00 - Work Restrictions and the Departmental Representative directives.

1.5 SUBMITTALS

.1 Shop drawings of flow diversion, and dewatering systems, including seepage control within the work area to Section 01 33 00 - Submittal Procedures.

- .1 Shop drawings shall be complete with Professional Engineer's seal and signature.
- .2 Submit design criteria and calculations of (for each stage of construction):
 - .1 flow capacity of diversion works to include 1/20 year return flood and to maintain seasonal operating levels;
 - .2 flow characteristics at intake, conveyance and outlet of diversion works to mitigate scouring and erosion, and to address environmental and public boating safety concerns;
 - .3 flow diverters and related structures; Provide methodology, details (including sequencing) and shop drawings for the removal of diversion system and for site restorations at areas disturbed by the removal of these temporary works.
 - .4 measures to control seepage, and surface drainage into the Work area, to keep the Work area in a dry state.

.2 Shop drawings of temporary construction access roads complete with Professional Engineer's seal and signature.

.3 Submit detail drawings to Regulatory Agencies, as required to satisfy conditions for granting of permits.

- .1 Modify detail drawings to meet Regulatory Agency Requirements.
- .2 Revise details to address site conditions encountered during construction.

1.6 TEMPORARY WORKS .1
ENGINEERING
SERVICES

Designer of flow diversion and other related dewatering structures, including seepage control, treatment and steel sheet pile cofferdam/wall, must be a Professional Engineer, licensed to practice in the Province of Ontario, with considerable expertise and experience in design of similar structures and systems, and be acceptable to the Departmental Representative.

- .2 Design Engineer must: make, check and sign all calculations; check, seal and sign all drawings; inspect dewatering and diversion structures and systems on site; verify their adequacy and safety; provide a written notice to the Departmental Representative stating that the temporary works have been constructed as per design requirements and that they are ready for safe operation.

1.7 DESIGN CRITERIA .1

Design flow diversion to pass river flow around the work area.

.1 Flow capacity of diversion works to include 1/20 year return flood with corresponding flow of 16.3 m³/s.

.2 Diversion system shall have capability of maintaining water levels within the regulated range and general practice, as described in Section 01 14 00 Work Restrictions.

.3 The Contract drawings show three proposed different locations for the Diversion Works. Only one need to be selected and approved by the Departmental Representative.

.4 The Contractor shall undertake their own evaluation as to the adequacy of this location to undertake the Works.

.5 The Contractor may choose an alternative location for the water diversion to be able to undertake Work, subject to Departmental Representative approval.

- .2 Ensure that the Diversion Works interfere with the passage of river flow past the construction site without causing flooding either upstream or downstream which would not have occurred without the dewatering structures at the site.

.1 Upstream water levels which exceed an elevation of 374.25 m are regarded as flooding.

- 1.7 DESIGN CRITERIA .2 (Cont'd)
(Cont'd)
- .2 Historical operating water elevations are given in Section 01 14 00 Work Restrictions.
- .3 At all times, provide Diversion Works with adequate capacity to discharge the river flows for each stage of dewatering, to ensure the achievement of all water control requirements.
- .1 Provide safe access for operation.
- .2 Provide training for operating staff.
- .3 Provide measures to protect Parks Canada Agency employees and public from temporary works (inlet and outlet), including warning and advisory signage, safety boom and buoys, and fencing.
- .4 Provide erosion control measures at the inlet, conveyance and outlet works as necessary.
- .5 Provide measures to prevent blockage by debris at inlet works.
- .4 Design temporary construction access roads to facilitate dam demolition/construction and Contractor's requirements for access.
- .5 At all times, maintain environmental quality of water, permits and approval stipulation to Section 01 35 43.
- .6 Ensure that no phase of Work threatens safe performance of steel sheet pile cofferdam.
- .7 Provide operating rule curves for the diversion control structure. Records of control structure settings are to be maintained throughout the duration of the project.
- 1.8 WATER LEVELS AND FLOW RECORDS .1 Seasonal operating levels are identified in Section 01 14 00.
- .2 Contractor must be able to pass flow safely through the construction site during the course of the work.
- 1.9 ENVIRONMENTAL REQUIREMENTS .1 Dispose of water so it does not create a safety or health hazard; or cause damage to environment, to adjacent property or to any portion of Work, or cause erosion of river banks or channel banks.
-

1.9 ENVIRONMENTAL
REQUIREMENTS
(Cont'd)

- .2 Prior to dewatering the work area, remove any aquatic species (fish and turtles) according to approved environmental plan. Work to be supervised by a knowledgeable and competent fishery expert.
- .3 Obtain MOE Permit to Take Water (PTTW) (required for the water diversion and dewatering work): in accordance with Section 01 35 43.
- .4 Turbidity limit: to Section 01 35 43 and Section 35 49 25.
- .5 During the installation of temporary construction access roads, steel sheet pile cofferdam, and construction of diversion system, provide measures to mitigate sediment transport.
- .6 Do not release any silt or other materials into watercourse during construction, including demolition, excavation, haulage and grading or removal of diversion system and temporary construction access roads.

1.10 PROTECTION

- .1 Protect dewatered work spaces from damage due to floods, rain, ice, snow or other adverse climatic conditions.
 - .2 Diversion works shall be constructed to safely pass flows without causing damage to adjacent works.
 - .3 Train staff for safe operation of diversion works.
 - .4 Provide back-up equipment as necessary to maintain a dry working area. Provide measures to monitor dewatering equipment.
-

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Only use material in good condition, accepted by Departmental Representative and suitable for their use in Work.
 - .2 Do not use materials which may cause environmental damage to waterway or to land at or near site. This includes materials which would cause turbidity in excess of limits specified in Section 01 35 43 - Environmental Procedures.
 - .3 Materials and methods proposed for use in Dewatering of the Site and Diversion are to be approved by all of the following:
 - .1 Ontario Ministry of Natural Resources.
 - .2 Ontario Ministry of the Environment.
 - .3 Federal Department of Fisheries and Oceans. The Plan (shop drawings) shall clearly demonstrate the materials to be employed and the methodology of installation, operation, maintenance, and removal along with restoration where applicable.
 - .4 Earth or granular materials with sand and fines is not acceptable for the temporary construction access road.
 - .5 If using sand bags for an interim measure, sand must be washed of fines before placing in the water. Bags are to be made of a synthetic reinforced material suitable for the purpose intended. The Departmental Representative may request a demonstration to confirm the filled bags can be installed and removed without any resulting turbidity. Sand bags are not to be used for long term solution for water diversion works.
 - .6 Note that Fisheries and Oceans prefers gravel/rock fill with rubber membrane, caissons, sand bags, bulk bags, or other types of in water works which do not generate turbidity.
-

PART 3 - EXECUTION

- 3.1 GENERAL .1 Evaluate, plan and execute Work to the design criteria, in a professional 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 including boating traffic.
 - .3 Safety of Work and of adjacent property and structures.
 - .4 Safety of removals.
 - .5 Safe operation (including training of staff) of operation of diverters and other equipment to maintain navigation and seasonal water levels.
 - .6 Environmental requirements.
 - .7 Clearance requirements for Work.
 - .8 Irregularities of adjacent surfaces.
 - .9 Changes in water levels.
 - .10 Minimize and manage risk associated with temporary Works including, monitoring and recording site conditions on a daily basis.
 - .11 Resolving site issues in a timely manner.
- 3.2 WATER MANAGEMENT AND DIVERSION CONTROL OPERATIONS .1 Provide a communication protocol with Parks Canada Agency acceptable to all parties including the Departmental Representative.
- .2 Do not make adjustments in flow diversion without notifying Agency . Provide estimated quantity of flow for diversion to Agency. Wait for confirmation and instructions from Agency.
 - .3 Maintain a record of date/ time/ setting/ calculated flow/ river stage and submit to Agency and Departmental Representative weekly.
 - .4 Operator of diversion system is to be on call at all times during construction period commencing when the diversion works are functional until project assumption.
 - .5 Operate diversion structure to maintain water levels within the operating range as given in Section 01 14 00 and as directed by Parks Canada Agency.
-

3.2 WATER
MANAGEMENT AND
DIVERSION CONTROL
OPERATIONS
(Cont'd)

- .6 The Contractor will be expected to operate the stop logs (or level control system) within the diversion dam on a weekly basis throughout the construction period, in response to PCA direction. Upon the onset of adverse weather, including mid-winter melts, warming temperatures, or additional precipitation, the frequency of dam operations may be daily.

3.3 DEWATERING

- .1 Dewater work spaces for the various tasks involved with the Work and maintain them in a fully dewatered state until Work is finished. Dewatering may require 24 hour maintenance and supervision.
- .2 Continue dewatering operations to enable Work to proceed in the dry for duration of Work.
- .3 Repeat entire dewatering procedure as often as may be necessary if flooding or other damage occurs before completion of Work.
- .4 Maintain the dewatered state by pumping from well-points and/or sumps.

3.4 WATCHKEEPER

- .1 Ensure continuity of dewatering by designating a Watchkeeper to make periodic checks both during the work and 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.

3.5 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.
- .3 Undertake service and maintenance of equipment according to approved environmental procedures.
-

- 3.5 EQUIPMENT
(Cont'd)
- .2 Standards and performance:
- .1 Provide equipment of such quality and in such quantity as to provide sufficient capability to perform essential functions of Work to the approved schedule.
 - .2 Equipment that is working in channel / river shall meet all environmental requirements.
 - .3 Equipment shall be inspected and serviced regularly. Provide copies of equipment inspection and service records when requested by the Departmental Representative.
 - .4 Provide emergency equipment for spills of deleterious substances.
 - .5 Provide standby replacement for pumps and other essential dewatering equipment which may break down during Work.
 - .6 Keep this replacement equipment available on site for immediate use.
- 3.6 REMOVAL OF
TEMPORARY WORKS
AND FLOW DIVERSION
- .1 At approved stages in Work, remove all temporary construction access roads and diversion system to original bottom level.
 - .2 Remove all construction access road materials to the founding soils to the satisfaction of the Departmental Representative.
 - .3 Remove entirely all flow diversion and restore the site to the original condition or better.
 - .4 Dispose of all unwanted materials off-site as approved by the Departmental Representative.
 - .5 Do not dispose of any materials in river.
 - .6 Undertake removals to the requirements of the regulatory permits and approvals, and to Section 01 35 43.
- 3.7 CLEAN-UP AND
RECTIFICATION
- .1 In accordance with Section 01 74 11.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 This section specifies requirements for the upstream safety boom installation as part of the safety requirements for navigation as set out by Transport Canada Navigable Waters and the Canadian Dam Association Guidelines.
- .1 Safety boom and warning buoys will be supplied by Parks Canada Agency. The Contractor is responsible for installation.
- .2 The work under this section also includes supply and installation in-water anchors along with all new connecting cable/chain link and hardware components as described on the Contract drawings.
- 1.2 RELATED SECTIONS
- .1 Section 1 22 01 - Measurement for Payment.
- .2 Section 1 33 00 - Submittal Procedure.
- .3 Section 01 56 00 - Temporary Barriers and Enclosures.
- .4 Section 05 50 00 - Metal Fabrications
- .5 Section 35 49 25 - Turbidity Curtain
- 1.3 MEASUREMENT PROCEDURES
- .1 There will be no separate measurement of Work described in this Section.
- .2 Payment of this Section shall be included in the applicable Lump Sum Price item as set out in Section 01 22 01.
- 1.4 REFERENCES
- .1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/A153m-09, Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware.
- .3 ASTM A325-10e1, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 minimum Tensile Strength.
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- 1.4 REFERENCES .1 (Cont'd)
(Cont'd) .4 ASTM A572/A572M-13a, Standard
Specification for High-Strength Low-Alloy
Columbium-Vanadium Structural Steel.
- 1.5 SUBMITTALS .1 Submit in accordance with Section 01 33 00.
.2 Submit manufacturer's printed product
literature and data sheets for the associated
hardware including product characteristics,
performance criteria, physical size, finish
and limitations.
- 1.6 DELIVERY .1 Parks Canada Agency will arrange delivery of
flotation units and warning buoys to the
construction site.
.2 Contractor is responsible for storing and
handling in accordance with manufacturer's
written instructions.

PART 2 - PRODUCTS

- 2.1 INTER BOOM AND ANCHOR CONNECTION HARDWARE .1 All connecting hardware between flotation
units and anchors shall conform to the
Contract drawings.
- 2.2 IN-WATER ANCHOR NAVIGATION WARNING MARKINGS .1 In-water anchor: shall conform to the
Contract drawings.
.2 In-water anchor to use a sub-buoy system for
connection to main hazard buoy to facilitate
removal and connection at spring and fall and
to minimize winter ice interference with
anchor.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Safety Boom:
- .1 Contractor is to only remove existing safety boom after completing works related to new safety boom anchorage and only immediately before placing new safety boom across channel.
 - .2 Install in accordance with manufacturer's instructions and as indicated on the Contract drawings.
 - .3 Do not make alteration to system components without written permission of Departmental Representative.
 - .4 Individual section of boom shall be connected to shoreline anchor or in-water anchor with separate clevis (shackle), unless otherwise indicated.
 - .5 Ensure that all warning messages are facing upstream. Alternate boom units with English and French warning messages.
- .2 Safety Boom Anchors:
- .1 The Contractor shall be responsible to supply, transport and install and align all field placed cast-in and in water anchors.
 - .2 Contractor to install in accordance with anchor design and manufacturer's instructions and as indicated on Contract drawings.
- 3.2 CONSTRUCTION .1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.
- .2 For installation of anchors, provide sediment control measures acceptable to Department Representative. Do not spill concrete into open waterways.
- 3.3 FIELD QUALITY CONTROL .1 Site Tests/Inspections:
- .1 Provide Departmental Representative with minimum 10 days notice prior to beginning any Work on safety boom assembly and provide access to Work for inspection.
 - .2 Safety boom constructed in whole or in part without inspection will not be accepted.
-

3.3 FIELD QUALITY .1
CONTROL
(Cont'd)

(Cont'd)

.3 Final inspection of safety boom will be made in place. Contractor to assist with access for inspection.

.1 Individual units are to be inspected by Departmental Representative prior to installation.

.4 Evidence of units having a lack of buoyancy, or damaged, as determined by the Departmental Representative will be cause for rejection and shall be returned to PCA.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Preservation of watercourses and related environments during construction activities and their restoration.
- 1.2 RELATED SECTIONS
- .1 Section 01 14 00 - Work Restrictions.
- .2 Section 01 35 43 - Environmental Procedures.
- .3 Section 01 22 01 - Measurement and Payment.
- .4 Section 01 33 00 - Submittal Procedures.
- .5 Section 01 35 43 - Environmental Procedures.
- .6 Section 01 78 00 - Closeout Submittals.
- .7 Section 31 11 00 - Clearing and Grubbing.
- .8 Section 35 20 22 - Dewatering and Diversion.
- .9 Section 35 49 25 - Turbidity Curtain (Silt Curtain).
- 1.3 ENVIRONMENTAL REQUIREMENTS
- .1 Operation of construction equipment in water is prohibited.
- .2 Use borrow material from watercourse beds only after receipt of written approval from Departmental Representative or governing authority having jurisdiction.
- .3 Design and construct temporary construction access roads to minimize environmental impact to watercourse.
- .4 Ensure construction activities do not impact downstream spawning beds.
- .5 Dumping excavated fill, waste material, or debris in watercourse is prohibited.
- .6 Underwater blasting is prohibited.
- .7 Carry out work to requirements of work permits.
-

- 1.3 ENVIRONMENTAL REQUIREMENTS (Cont'd)
- .8 Install turbidity curtain to prevent sediment from construction activities from entering the watercourse and being transported beyond the approved work area to Section 35 49 29.
- .9 Construction of sediment and erosion control measures and in particular the sediment trap within the dewatered area of the construction limit shall be considered by the Departmental Representative.
- .1 The Contractor shall demonstrate that other alternative locations outside the dewatered area have been explored and have been found to be impractical or not acceptable to the regulatory and local authorities.
- .2 The Contractor shall demonstrate to the satisfaction of the Departmental Representative that there will be no short term and long term environmental impacts to the watercourse.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 PREPARATION .1 Obtain work permits from governing Federal, Provincial, Municipal and/or Conservation Authority.
- 3.2 EXISTING CONDITIONS .1 Maintain existing flow pattern in natural watercourse systems.
- 3.3 SITE CLEARING AND PLANT PROTECTION .1 Undertake site clearing to Section 31 11 00.
- .2 Conduct work to provide minimal disturbance to vegetated buffer zones. Protect trees and plants on site and adjacent properties where indicated.
- .3 Maintain temporary erosion and pollution control features installed under this contract.
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- 3.4 DRAINAGE
- .1 Pumping water containing suspended materials into watercourse is prohibited.
 - .2 Establish rock chute spillways and energy dissipater at outlet of diversion works to accommodate safe surface water entry to watercourse as approved by the Departmental Representative.
 - .3 Maintain existing drainage patterns on adjacent lands to the water course to the greatest extent possible.
 - .4 Undertake channel diversion system to requirements of Section 35 20 22.
- 3.5 SITE RESTORATION
- .1 Remove sediment and erosion control measures with approval of Departmental Representative.
 - .2 Protect new planting material from disturbance by construction activities.

END

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Installation of a turbidity curtain as part of the preservation of the watercourse.
- 1.2 RELATED SECTIONS .1 Section 01 14 00 - Work Restrictions.
.2 Section 01 22 01 - Measurement and Payment.
.3 Section 01 33 01 - Submittal Procedures.
.4 Section 01 35 43 - Environmental Procedures.
.5 Section 35 20 22 - Dewatering and Diversion.
.6 Section 35 42 19 - Preservation of Watercourses.
- 1.3 MEASUREMENT AND PAYMENT PROCEDURES .1 There shall be no separate measurement for payment for the supply, installation and maintenance of a Turbidity Curtain within a watercourse. Include cost in Contract Lump Sum Price.
.2 Payment shall be made as set out in Section 01 22 01 and shall be incidental to applicable item of work for environmental controls and dewatering and diversion work.
.3 There shall be no further compensation for modifications to the sediment and erosion control plan including the turbidity curtain should this plan need to be modified to meet the permitting requirements and/or the monitoring specifications.
- 1.4 REFERENCES .1 American Society for Testing and Materials (ASTM)
.1 ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
.2 ASTM D4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
.3 ASTM D4716-08, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit
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- 1.4 REFERENCES
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- (Cont'd)
- .1 (Cont'd)
 - .3 (Cont'd)
Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - .4 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, Textile Test Methods.
 - .2 CAN/CGSB-148.1, Methods of Testing Geosynthetics.
 - .1 No.2-M85, Mass per Unit Area.
 - .2 No.3-M85, Thickness of Geotextiles.
 - .3 No.6.1-93, Bursting Strength of Geotextiles Under No Compressive Load.
 - .4 No.7.3-92, Grab Tensile Test for Geotextiles.
 - .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 Ontario Provincial Standard Drawings (OPSD)
 - .1 OPSD 219.260 November 2006, Turbidity Curtain.
 - .2 OPSD 219.261 November 2006, Turbidity Curtain, Seam Detail.
 - .5 Ontario Provincial Standard Specification (OPSS)
 - .1 OPSS 577 November 2006, Construction Specification for Temporary Erosion and Sediment Control Measures.
- 1.5 SUBMITTALS
-
- .1 Submit details of the temporary turbidity curtain system to the Departmental Representative prior to the start of the Work.
 - .2 Submit to Departmental Representative details of geotextile material and seam at least 2 weeks prior to commencing work.
 - .3 Complete the submission of a Sediment Control Plan as described in the Ministry of Natural Resources Technical Note, TN-20, Sediment Control Plans: Reducing Sediment Concerns at Water Crossings, dated 1992, to the Departmental Representative to meet the requirements of all review agencies. Ensure
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1.5 SUBMITTALS .3 (Cont'd)
(Cont'd)
compliance of the sediment control plan
throughout the project.

1.6 DELIVERY AND STORAGE .1 During delivery and storage, protect
geotextiles from direct sunlight, ultraviolet
rays, excessive heat, mud, dirt, dust, debris
and rodents.

PART 2 - PRODUCTS

2.1 MATERIAL .1 Geotextile: woven synthetic fibre fabric,
supplied in rolls.
.1 Width: approved by the Departmental
Representative.
.2 Length: as specified on contract
Drawings.
.3 Composed of: minimum 85% by mass of
polypropylene polyester with inhibitors added
to base plastic to resist deterioration by
ultra-violet and heat exposure for 60 days.

.2 Physical properties:
.1 Thickness: to CAN/CGSB-148.1, No. 3,
minimum 0.8 mm.
.2 Mass per unit area: to CAN/CGSB-148.1,
No. 2, minimum 220 g/m².
.3 Tensile strength and elongation (in any
principal direction): to ASTM D4595.
.1 Tensile strength: minimum 1350N,
wet condition.
.2 Elongation at break: minimum
maximum 25%.
.3 Seam strength: minimum 1350N equal
to or greater than tensile strength of
fabric.
.4 Mullen burst strength: to
CAN/CGSB-4.2, method 11.2, minimum 4000N,
equal to or greater than tensile strength
of fabric.

.3 Hydraulic properties:
.1 Apparent opening size (AOS): to ASTM
D4751.

.4 Seams: sewn in accordance with manufacturer's
recommendations.

2.1 MATERIAL .5 Thread for sewn seams: equal or better
(Cont'd) resistance to chemical and biological
degradation than geotextile.

PART 3 - EXECUTION

3.1 GENERAL .1 Complete the submission of a Sediment Control
Plan as described in the Ministry of Natural
Resources Technical Note, TN-20, Sediment
Control Plans; Reducing Sediment concerns at
Water Crossings, dated 1992, to the
Departmental Representative. Where directed by
the Departmental Representative, submit to the
review agencies as part of any permit
requirements. Modify the sediment and erosion
control plan to address the review agency
comments. Ensure compliance of the sediment
control plan throughout the project.

.2 Supply, install, maintain, replace and remove
silt curtains when instructed by the
Departmental Representative.

.3 Monitoring of water turbidity outside the
silt curtain will be carried out by the
Contractor as set out in Section 01 48 00 .
Maximum allowable increase of turbidity above
background levels is 5 NTUs (Nephelometric
Turbidity Units).

3.2 INSTALLATION .1 Turbidity curtains shall consist of turbidity
curtain geosynthetic, load line, flotation,
ballast, anchors, mooring buoys, mooring
lines, adjustment lines, and tie-downs.

.2 Design to conform to Ontario Provincial
Standard Specification, OPSS 577 and Ontario
Provincial Standard Drawings: OPSD 219.260 and
OPSD 219.261 as a minimum.

.3 Turbidity curtains shall be constructed as
follows:
.1 The flotation shall provide support
along the length of the turbidity curtain.
.2 A sleeve shall be formed and heat-sealed
or sewn along the entire bottom edge of the
turbidity curtain geosynthetic, to contain the
ballast in the sleeve. Breaks may be made in
the sleeve to facilitate pulling, provided
they are a minimum 100 mm in size and spaced
at minimum 3 m intervals.

3.2 INSTALLATION .3
(Cont'd)

(Cont'd)

.3 Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal and prevent the escape of turbid water between the sections.

.4 The turbidity curtain, as prepared for installation, shall be of sufficient width to account for water depth and wave action.

.5 Adjustment lines shall be placed at maximum intervals of 10 m, and are to encircle the turbidity curtain from top to bottom.

.6 The turbidity curtain shall be prepared for installation by furling and tying with furling ties every 1.5 m for the entire length of the curtain.

.7 Anchor locations shall be established as is necessary to maintain the turbidity curtain in place and functioning.

.8 Provide buoys or other navigation markers to identify the location of the turbidity curtain to boaters.

.9 Place turbidity curtain to maintain a clear navigation channel as set out in the contract drawings and approved by the Departmental Representative.

3.3 OPERATION AND .1
MAINTENANCE

Turbidity curtains shall be installed to prevent sediment passage, from the area enclosed by the curtain, to the remaining water body. Turbidity curtains shall be installed and maintained in a manner that avoids entry of equipment, other than hand-held equipment or boats, to the remaining water body.

.2 Equipment is permitted in the work area enclosed by the turbidity curtain.

.3 Turbidity curtains shall be operated and maintained in the specified location, with the entire top edge above the water surface.

.4 The curtain shall be free of tears and gaps, and the bottom edge of the curtain is to be continuously in contact with the water course bed so that sediment passage from the area enclosed is prevented.

.5 Any folds in the turbidity curtain which form next to the flotation collar shall be regularly monitored and freed of collected sediment.

3.3 OPERATION AND
MAINTENANCE
(Cont'd)

- .6 Monitor and maintain the turbidity curtain booms both during and outside normal working shifts as required. Provide all personnel, materials and equipment necessary to maintain, repair or relocate the silt curtain system.
- .7 Carry out construction operations to minimize impact on fish habitat from both disturbed sediments and fill materials.
- .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .9 Remove debris trapped by the turbidity curtain regularly and dispose at an approved location.
- .10 Remove turbidity curtain when authorized by the Departmental Representative after completion of the work.

END
